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ORGANIZATION CHART

ECONOMIC COMMISSION FOR EUROPE

TIMBER COMMITTEE (1947)
(ECE/FAO Timber Division, Geneva)

JOINT COMMITTEE: Forest Working Techniques and Training of Forest Workers

JOINT WORKING PARTY: Forestry Statistics

EUROPEAN FORESTRY COMMISSION (1948)
(FAO HEADQUARTERS: Rome)

WORKING PARTIES:
- Afforestation and Reforestation
- Torrent Control and Avalanches

NEAR EAST FORESTRY COMMISSION (1955)
(FAO REGIONAL OFFICE: Cairo)

WORKING PARTY: Forest Grazing
COMMITTEE: Research

JOINT SUB-COMMISSION ON MEDITERRANEAN FORESTRY PROBLEMS
***Silva Mediterranea* (1948)**
(FAO HEADQUARTERS: Rome)

WORKING PARTIES:
- Cork-Oak
- Eucalyptus
- Afforestation Techniques

ASIA-PACIFIC FORESTRY COMMISSION (1950)
(FAO REGIONAL OFFICE: Bangkok)

SUB-COMMISSION: Teak
WORKING PARTIES:
- Grading and Standardization
- Public Education in Forestry
- Watershed Management

COMMITTEES:
- Silvicultural and Forest Management Research
- Forest Products Research

LATIN AMERICAN FORESTRY COMMISSION (1949)
(FAO REGIONAL OFFICE: Rio de Janeiro)

WORKING PARTIES:
- Forestry Development
- Afforestation and Reforestation

COMMITTEE: Research

FAO FORESTRY DIVISION (1945)
(HEADQUARTERS: Rome)

TECHNICAL COMMISSIONS

INTERNATIONAL POPLAR COMMISSION (1947)

INTERNATIONAL CHESTNUT COMMISSION (1952)

TECHNICAL COMMITTEE

JOINT FAO/IUFRO COMMITTEE ON BIBLIOGRAPHY (1949)

TECHNICAL PANELS

MECHANICAL WOOD TECHNOLOGY (1947)

WORKING PARTIES:
- Mechanical Properties of Timber
- Physical Properties of Timber
- Fibreboards and Chipboards
- Veneer, Plywood and Other Glued Veneer Constructions
- Structural Grading
- Fire-Test Methods
- Sawing and Machining
- Classification of Wood-Base Materials

WOOD CHEMISTRY (1947)
FOREST GRAZING (1954)
FORESTRY EQUIPMENT (1954)
FORESTRY EDUCATION (1955)

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SO BOLD AN AIM

In 1945, the Chairman of the First Session of the FAO Conference, Mr. Lester B. Pearson of Canada, stressed that FAO was the first functional international agency to set out with so bold an aim as that of helping nations to achieve freedom from want.

The Chairman of the Eighth Session of the Conference of FAO, Mr. K. J. Holyoake, Deputy Prime Minister and Minister of Agriculture, New Zealand, reviewed the progress made since then.

"FAO is only ten years old," he said. "It is a young Organization. I think it can be likened to a boy being forced to undertake a man's task before he is out of his teens... But I suggest... that FAO is setting an outstanding example of what can and must be done in other fields of international activity."

For the Organization's regular program of work the Conference passed a budget of $6.6 million for 1956 and $6.8 million for 1957. The funds likely to be available to FAO in 1956 from the United Nations Technical Assistance Fund will be in the region of $8 million. The Conference supported the Director-General's ideas for integrating the Technical Assistance Program more completely with the Regular Program.

The Conference agreed to a new category of Associate Membership of FAO for non-self-governing territories. Tunisia was admitted to full membership in FAO to become the seventy-second Member Government.

Initial arrangements were approved for a survey and appraisal of world agriculture, fishery and forestry resources in relation to needs, on a limited experimental basis. The Conference also agreed that the Organization should assume responsibility for the diffusion of information on the application of atomic energy in agriculture and related fields, and approved with some modifications the Director-General's proposal to introduce advanced Fellowship awards, with emphasis on research, under the regular program of the Organization.

With an eye to the world's rapid rate of population increase, the Conference decided that efforts to increase production and consumption must be heightened, even though some countries at the moment have large surpluses of certain agricultural products. The aim will be to increase efficiency in production – raising productivity per man, per hectare and per unit of cost. A decrease in costs and an increase in incomes are both elements of higher national living standards.

Cover photograph: *More than half of world forest production is of firewood. For countless people like this boy gathering scrub fuel from the mountain side in Afghanistan, FAO's work in the development of world forestry is indirectly of great importance. The 1955 Session of the Conference of FAO directed that the Organization's work relating to correct watershed management and the influences of forest and other vegetative cover, should be strengthened. Governments must spread information on the techniques for improving the management of forest and other vegetative cover on the slopes of watersheds.*

The Conference in Rome celebrates the Tenth Anniversary of the Founding of FAO

The actual day of the Tenth Anniversary, 16 October 1955, was commemorated by a special meeting on that date at the Chateau Frontenac in Quebec, Canada, where FAO was formally founded in 1945.

Reviewing the work of FAO before the Conference at Rome, Dr. Cardon, the Director-General, emphasized his determination to achieve much closer integration in future between the activities financed from the regular budget and those financed from the international Technical Assistance Fund. Whilst a distinction must be maintained regarding the financial responsibilities of the Organization in connection with the expenditure of the money drawn from these respective sources, the work undertaken under each head is so closely interrelated that any attempt to maintain the conception of two separate programs would be misleading. Statistical, economic and technical studies and publications prepared under the Regular Program provide the background against which FAO carries out its Technical Assistance projects. International agreements and consultations at meetings financed from the regular budget are, in many cases, the basis upon which Technical Assistance is provided.

He also attached great importance to FAO collaborating fully with its sister agencies in matters of common interest, but on such a basis as to maintain its own independent responsibility for those fields of work which have been entrusted to its charge. There are many activities which fall into the marginal area which exists between the broadly defined responsibilities of the different agencies. This is not altogether surprising seeing that all the different agencies are ultimately concerned with human beings in their various aspects, and that their problems of education, health, nutrition, and industrial activities are very closely connected. Agriculture cannot be prosperous if those engaged in it are diseased, illiterate or required to work under unsatisfactory conditions.

At a later stage, a majority of delegates expressed the hope that it would indeed prove possible to set up a special United Nations Fund for Economic Development or some similar institution, as was now under consideration by the General Assembly of the United Nations, and that FAO could be closely associated with its functioning.

Directive for World Forestry

THE Conference of FAO, meeting at Rome from 4 to 26 November 1955, said in its final report that its review of progress in world forestry over the last decade testified to the wisdom of FAO's founders in deciding to include forestry within the scope of FAO. The place of forestry in the development programs of Member Governments had thereby been enhanced. Certain accompanying features of the Organization's work in forestry were especially gratifying: the establishment of closer ties and understanding between producers (the forester and forest owner) and the users of forest products (industry and trade), and between both these groups and research specialists; better appraisals of the extent and nature of existing forests; more scientific study of the demand for timber and of its rational use; wider recognition of the relationship between forest development and other sectors of national economies, and notably of the interdependence of forestry and agriculture.

While noting that governments had made some considerable progress in the past ten years in informing public opinion on the protective and productive roles of the forest, the Conference stressed the need, especially in the less developed regions, for more intensive mass educational work to arouse the "forest consciousness" of the populations, particularly of the younger generation.

To carry out a detailed consideration of the Director-General's program of work in forestry for 1956 and 1957, the Conference set up a Technical Committee on Forestry and appointed as its Chairman Mr. Susilo Hardjoprakoso, Director of Forestry, Ministry of Agriculture, Indonesia. The Committee, which in turn elected as its Rapporteur Mr. J. H. Jenkins, Forest Products Laboratories Division, Department of Northern Affairs and National Resources, Canada, comprised representatives of 32 countries. Well-known personalities who served on the Committee included Richard E. McArdle, Chief of the United States Forest Service; Tom Gill, Chairman of the Committee on International Relations of the Society of American Foresters; Anton Ceschi, Chairman of the Forestry Subcommittee of the Austrian National FAO Committee; Eino Saari, leader of the Finnish delegation to the FAO Conference; F. Merveilleux du Vignaux, Directeur-général des eaux et forêts, France; Walter Mann, Ministerial Director, Germany; C. R. Ranganathan, Inspector-General of Forests, India; Mahmoud Zahir, Directeur-général du Ministère de l'agriculture, Iran; Alberto Camaiti, Director-General of Forests, Italy; Nils Ihlen, Director of the Norwegian Forest Society; Y. S. Ahmad, Inspector-General of Forests, Pakistan; H. M. E. Näslund, Chief Director of the Swedish Forest Research Institute; J. Keller of the Swiss Inspection fédérale des forêts, chasse et pêche; Sir Henry Beresford-Peirse, Deputy Director-General, Forestry Commission, London; and, as observer, Aldo Pavari, President of the International Union of Forest Research Organizations.

Regional Activities

Adopting the report of its Committee, the Conference expressed satisfaction with the trend of the actions taken during this period by the regional Forestry Commissions for Europe, Latin America, the Near East, and Asia and the Pacific. The method of relying increasingly on working parties to deal with technical subjects, was commended: the world-wide scope of the Organization's forestry activities required that adequate travel funds should be at the disposal of the Director-General.

As yet, no forestry commission exists for the North American region, and the Conference noted with satisfaction that the countries concerned were planning to discuss this matter together on an informal basis.

As regards the Far East, the Conference urged an intensification of effort in projects relating to the housing problem and to sound watershed management. Attention should also be concentrated on the special problems involved in making inventories of tropical forests through the use of aerial survey methods. The Director-General was asked to give priority, under the Technical Assistance Program, to the development in the region of a research and training center in aerial survey techniques for tropical forests.

Notable precedents created in Latin America in the past two years had been the agreement reached between the Government of Venezuela and FAO for the establishment of a Latin-American Forest Research and Training Institute, and the convening, in collaboration with the Argentine Government, the United Nations Economic Commission for Latin America and the United Nations Technical Assistance Administration, of a Latin-American meeting of pulp and paper experts at Buenos Aires in 1954. The Conference welcomed the establishment of an advisory group of experts to give help to countries that want an impartial assessment of alternative schemes for pulp and paper industries and guidance in the planning and initiation of new projects.

In no region is the need for an expansion of forestry so pressing as in the Near East, and the Conference noted with satisfaction the holding of the first session of the Near East Forestry Commission in Iran in September 1955. It commended the Director-General for the increased attention being given in his program of work to arid zone forestry. The compilation of a first Arabic forest terminology was noted with great interest.

The conclusions of the FAO/ECE study on *European Timber Trends and Prospects* had given direction to the current work programs of both the European Forestry Commission and the Timber Committee of the Economic Commission for Europe. The Conference noted with satisfaction the recent rising trend of industrial wood output in Europe, the increased European forest potential revealed by new national

inventories, and the relative smoothness with which the timber market in Europe had adjusted itself to a rapid expansion in the intra-regional trade in forest products in recent years.

The Conference endorsed the activities of the working parties on eucalyptus and cork-oak of the Joint Sub-Commission on Mediterranean Forestry Problems, as well as the work carried out by the International Poplar Commission and the International Chestnut Commission. It welcomed especially the collaboration of foresters in the deliberations of the group of experts meeting under the auspices of the Economic Commission for Europe to study specific plans of economic development in southern Europe.

The Conference hoped that the Organization would be able to play a more active part than hitherto in forestry development in Africa south of the Sahara. It particularly expressed the hope that collaboration between FAO and the Commission for Technical Co-operation in Africa South of the Sahara could be intensified in the coming years.

While fully endorsing the value of the forestry work carried out under the Expanded Technical Assistance Program, the Conference appreciated that the deliberations and recommendations of the regional forestry commissions showed that governments could in several instances derive greater benefit from this program at less cost if a higher proportion of the Technical Assistance funds available to the Organization could be devoted to regional as distinct from national projects.

Technical Activities

The Conference found the Director-General's proposed program of work in forestry for 1956 and 1957 to be well-conceived and appropriately balanced, from the standpoint of both subject matter and equitable distribution all over the world. To help him in giving the right balance of emphasis to the various lines of activity of his program of work in forestry, the Conference wished to record the following comments.

Land-use and conservation

While in certain areas of the world the course of economic development generated increasing pressure to convert some forest land to animal and crop production, in no part of the world should such changes in land-use be sanctioned without the advice of the forest authorities, since the most drastic consequences for the soil and water regime could attend ill-considered deforestation. The Conference fully endorsed the emphasis given in the Director-General's program to forest influences, range management (forest grazing) and watershed management, and hoped that this work might be even further strengthened. It drew the attention of governments particularly to the need for more intensive study of forest influences in the tropics, where many countries were embarking on large river-valley development projects.

Forest legislation and forms of forest land ownership

Although some delegates questioned the immediate value of analytical studies on forest legislation and on the relative value and effects of different forms of land ownership, it was generally conceded that this type of work was a pre-requisite for the initiation of sound forestry programs in the less developed regions and afforded essential background information for experts operating under the Technical Assistance Program.

Silviculture and management

The Conference endorsed the emphasis given in the forestry program to improving forest production and singled out for special mention the work in tropical forestry and planting techniques. It approved the proposal to convene a world technical conference on eucalypts in the autumn of 1956 and noted with great appreciation an offer made on behalf of the Government of Italy to act as host country.

Utilization

The Conference wholly approved the program of work on utilization of the products of the forest, calling attention to its direct bearing on general economic development, especially of the less advanced countries. It commended the Director-General on his proposal to call a technical conference on fibreboard and chipboard and hoped that a wide attendance could be secured of technicians and representatives of producing and consuming interests.

Forestry statistics and special studies

The Conference noted with satisfaction the progress achieved in many countries in raising the standard of national forestry and forest products statistics. It stressed the practical import to foresters and wood users of the joint study of FAO with the Economic Commission for Europe (ECE) now proceeding on trends in the utilization of wood and its products; of the study of timber trends in the Far East, due to be undertaken in co-operation with the Economic Commission for Asia and the Far East (ECAFE); and of similar regional studies which of themselves would induce an improvement in statistical methodology and the scope of data collected.

World Forestry Congresses

The Conference expressed its sincere gratitude to the Government of India for having organized the Fourth World Forestry Congress in December 1954. It noted that the recommendations of the experts assembled at Dehra Dun were entirely in keeping with the objectives and program of FAO.

The Conference endorsed the recommendation made by the Congress that FAO should establish a panel of experts on forestry education, noting that the Director-General had already taken steps to implement this proposal. However, it could not at this time accept the Congress's proposals for the creation of new international commissions, sponsored by FAO, on exotic species for planting in the tropics and on forestry in arid zones.

It authorized the Director-General to take such steps as are necessary and appropriate to assist in organizing the Fifth World Forestry Congress in 1960.

Program Trends

To give guidance to the Director-General in framing his 1958-59 program of work in forestry, the Conference discussed a number of important problems in world forestry, and drew attention to some of the major tasks which confronted Member Governments and to ways in which the Organization could help in arriving at solutions.

World wood resources and requirements

The Conference discussed the relation between world forest resources and prospective wood requirements, and drew the attention of Member Governments to the following conclusions:

1. An expanding world economy and the rapid increase in populations promised substantially to raise industrial wood needs; this increase would be most pronounced in the less developed areas of the world.
2. Technical changes taking place in the wood-using industries, as well as changes in consumer needs, had changed, and would continue to change, the pattern of industrial wood requirements. For example, the need for pulpwood would grow more rapidly than requirements of other major categories.
3. The changing needs of industry implied changed requirements from the forests. But adjustments in forest policy could take effect only slowly; once initiated, they could not easily be reversed. Moreover the forester, besides raising forest output and adapting it to the changing needs of industry, had to bear in mind the forest's productive capacity over the long term and to pay due regard to the protective functions of the forest.
4. For the formulation of forest policies, whether at the national, regional or world level, an understanding of the implications of technical and economic trends in wood use was no less important than the assessment of the extent and nature of existing forest resources.

The Conference therefore urged member countries to devote increasing attention to the quantitative and qualitative appraisal of current and prospective wood resources and requirements. It requested the Director-General to continue his efforts to assess, region by region, present and future demand and supply for wood, in order to provide member countries with the elements necessary for formulating national forest policies and also their import or export policies, thus facilitating, where appropriate, the elaboration of regional production and trade policies.

Finally, the Conference suggested that the topic of world wood resources and requirements should be a major theme for the Fifth World Forestry Congress which, it was hoped, would be attended by the chiefs of the forest services of all the countries of the world.

Tropical forestry

The Conference noted that economic progress in the less developed areas of the world, as well as the expected increase in wood requirements in all regions, now rendered necessary more concentrated attention on the problems of tropical forestry. Hitherto, harvesting of heterogeneous tropical forests has been difficult, selective and wasteful, but in recent years technical advances which have broadened the raw material basis of the wood-using industries offer new hope of more complete utilization.

However, many problems, mainly of an economic nature, remain to be solved. The magnitude of these problems tends to divert attention rather to the establishment of man-made forests, sometimes of exotic species, either where the existing tropical forests have been cleared or on other areas. But the Conference decided there was no occasion to adjudicate finally between natural forests and plantations in all circumstances. The choice could only be resolved case by case, with a full knowledge of local needs for forest products and the silvicultural and ecological possibilities in each locality. This dilemma called for much more precise data than were presently available concerning the silvicultural, technical and specially economic aspects of exploiting natural tropical forests and of establishing and exploiting plantations.

The Conference therefore requested the Director-General, in drawing up his program of work in forestry for 1958, 1959 and subsequent years, to give attention to:

1. technical studies on the methods for the natural or artificial regeneration and development of the tropical evergreen forest, and the silvicultural systems and management methods to be applied;
2. the fostering of technical, technological and industrial research and the dissemination of the results, so as to enable as complete a use as possible of the produce of tropical forests of all categories;
3. comparative economic studies on the silviculture and utilization of the various types of tropical forest;
4. the collection, analysis, and publication of information on all aspects, but especially on the economic aspects, of the establishment of pure or mixed plantations of indigenous and exotic species in the tropics.

Finally, the Conference strongly supported the Director-General's proposal to convene a special meeting of experts on the various aspects of tropical forests and the utilization of their products, to consider the problems outlined above, and expressed the hope that it would prove possible to arrange such a consultation at an early date, preferably in 1956.

Productivity in forest operations and industries

The Conference endorsed the long-term aim of the Director-General's program in forestry: to ensure the most productive use of forest land, labor and capital. It noted that emphasis in this program had so far

been limited to raising efficiency in forest operations and to forest workers' training, through both the Regular and the Expanded Technical Assistance Programs. Believing that it was not less necessary to take parallel measures to increase productivity in forest industries, the Conference

1. requested the Director-General to continue his efforts to secure the improvement and where appropriate the mechanization of forest operations, particularly logging;
2. urged that this work be extended to all regions, taking due care to ensure that regional efforts were correlated and overlapping studies and activities avoided;
3. drew the attention of the Director-General and of Member Governments to the urgent need to promote greater efficiency in the several forest products industries, thus ensuring more rational use of the output of the forest and minimizing waste;
4. emphasized the contribution that could be made to the achievement of this objective by the exchange of technical information, the holding of technical consultations and by Fellowships.

Regional co-ordination of forest research activities

The Conference reaffirmed the importance of research in the proper development and use of the world's forest wealth, including research into the possible uses of atomic energy, and stressed the advantages that could accrue to member countries if a proper degree of integration and co-ordination of research activities were assured. It registered its approval of the tangible progress made in research co-ordination in those regions where research institutes already in being were very limited in number. This was evidenced by the formation of regional research organizations in the Near East and Latin-American regions, with central institutes in Syria and Venezuela respectively. The Conference agreed that the Director-General should establish research co-ordination committees under the regional Forestry Commissions in the Near East and Latin America and also in the Asia-Pacific region, as requested by the respective Forestry Commissions.

The Conference also noted with approval the Director-General's intention to bring about such research co-ordination in consultation with the International Union of Forest Research Organizations.

Forest and agriculture land use problems in watershed management

This subject was discussed by a joint meeting of the Conference's Technical Committees on Agriculture and Forestry, and subsequently the Conference enphasized the extreme importance of these problems, and specially commended the inter-divisional approach to them adopted by the Organization.

As the result of its discussion on watershed management, the Conference strongly drew the attention of governments to:

1. the fact that the management of watersheds was a basic activity in agricultural and forest production;
2. the fact that the aims in watershed management were directed toward the application of soil conservation and the control and use of water;
3. the importance of conservation practices in the use of lands for agriculture, grazing and forestry: the consequences of overgrazing and mismanagement of range lands and the disappearance of plants valuable for forage production and soil conservation, can be devastating;
4. the seriousness of shifting cultivation in both the agriculture and forest economies particularly of tropical areas;
5. the tremendous magnitude of the problem of watershed management: FAO could only furnish advice and guidance in this field and the real action on corrective measures must be taken by governments;
6. the fact that this is an international problem and that international co-operation is often required;
7. the highly variable conditions around the world and the need for research in watershed management and hydrology as well as for education programs to aid individual landowners;
8. efforts by FAO to organize training centers and related educational activities for the benefit of technicians concerned with watershed management: it was noted that such a training center was planned for the Far Eastern region in 1957 and that India had generously offered to serve as host country for the center.

The Conference recommended that the Organization, in continuing its studies on watershed management and related problems, draw up a specific program indicating priorities for implementation by governments and by FAO, in order to achieve tangible improvements. It drew attention to the great importance of watershed management in flood prevention and control but recognized that there were also other objectives in watershed management, for instance the elimination of stream pollution including siltation, the improvement of navigation, and the development and improvement of domestic and industrial water supplies.

The following countries were represented on the Technical Committee on Forestry: Afghanistan, Argentina, Australia, Austria, Belgium, Burma, Canada, Ethiopia, Finland, France, Germany, India, Indonesia, Iran, Iraq, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Pakistan, Philippine Republic, Portugal, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States of America, Viet-Nam and Yugoslavia. The delegations of some Member States were too small in numbers to permit whole-time participation in the Forestry Committee. Representatives of Brazil, Ireland and Jordan attended some meetings.

FAO's Interest in Atomic Energy

by FAO Staff

This survey was prepared for submission to the United Nations International Conference on the Peaceful Uses of Atomic Energy held in Geneva, August 1955. It is reproduced in Unasylva *at the request of the Permanent Committee of the International Union of Forest Research Organizations. In the course of their last session at Stockholm in September 1955, the members of this Committee visited the field research station of the Swedish Forest Research Institute at Bogesund, and Professor Ake Gustafsson, of the Department of Genetics, demonstrated the nearby center for experiments into the genetic effects of acute and chronic* ^{60}Co *gamma irradiation on different plant species. The radiocobalt source used is in the middle of an experiment field about 100 meters square, surrounded by earth walls and high steel fencing to secure protection and prevent uncontrolled entry to the irradiated area. When in use the source is 70 centimeters above ground. It is suspended by a wire in a brass tube and there is an iron extension of the tube to a depth of about two meters below the ground. The lowering of the source into the iron part of the tube is operated from the fence gate, the gate lock being connected with the lowering winch so that entrance into the experimental area is impossible until the source is safely below ground.*

The present world population of about 2.5 thousand million is growing at the rate of nearly 1.5 percent each year. Every day nearly 100,000 additional hungry mouths appear at the breakfast table, and twenty-five years hence it is expected that we shall be 3.5 to 4 thousand million in number. Evidently one of the many major problems facing us, probably basically the most important for the future welfare of mankind, is how we shall be able to provide food, clothing and shelter for the world's peoples at the ever higher standards that they so rightly expect.

The neo-Malthusians believe that we are engaged in a losing battle and that it will not be possible for world resources to meet requirements. FAO believes that technically it is possible to achieve the necessary increases in production of foodstuffs and basic raw materials to meet world needs for the foreseeable future, and has recommended to governments that they aim at increases in production one to two percent greater than their anticipated growth in population. For many countries this will mean production increases of 3 to 4 percent a year. This admittedly will do little more than maintain the *status quo* but even so the social, political and administrative problems involved will be of immense magnitude. Their solution alone, quite apart from the further urgent need to make a real improvement in the inadequate subsistence levels which at present characterize so many parts of the world, will require determination and fortitude on the part of governments. Although freedom from want must depend essentially upon the efforts made by each country on its own behalf, success in achieving this is of such general concern to all peoples that these national efforts should be supplemented by pooling the knowledge and experience of all countries on an international basis for the common good. In doing so, it is imperative that all possible advantage be taken of the contributions to increased production that might come from scientific and technical advances in other fields. Amongst those advances the development of atomic energy is of great significance for agriculture and the related industries of forestry and fisheries.

From the technical standpoint the solution of the problems of providing more of the primary necessities of life can come in three main ways. The easiest method of increasing supplies is by taking adequate measures to reduce the heavy losses which at present occur in all segments and stages of production, storage and distribution. Secondly, the productivity of land now under cultivation could be much increased and the current utilization of our fisheries and forestry resources intensified through development of improved technical methods. Finally, supplies could be increased by developing new areas and resources, but this is the most difficult course as those areas and resources most easily developed are already being utilized.

The ways in which atomic energy can help in feeding, clothing and housing the world's growing population will be considered in relation to these three main ways of improving production and making better use of our natural resources.

The Significance of Atomic Energy for Food and Agriculture

When relatively inexpensive power from nuclear reactors becomes generally available it will undoubtedly make a substantial impact on agriculture, if only by cheapening costs of production and distribution, improving conditions of work and making modern conveniences and comforts more widely available in rural communities. This is particularly true in areas where other sources of power are deficient. These and other at present more speculative developments must, however, await the widespread application of nuclear power in industry, and its possible contributions will be discussed a little more fully later. At present and for the immediate future the radioactive isotopes and radiation that have become available as by-products of nuclear reaction are of greater importance to agriculture.

It was at one time thought that radiation and radioactive isotopes might prove of direct value in the stimulation of plant growth. To date, the only stimulatory effects in the irradiated generation which

have been observed in extensive investigations conducted in the United States of America, the United Kingdom and Canada have been those associated with damage to the plant, much as growth is stimulated, in a sense, by the use of the pruning knife, and there has been complete failure to substantiate the earlier hope for useful stimulation of growth.

Neither radiation nor radioisotopes, therefore, can make any direct contribution to increased production in the sense that an application of fertilizer leads to increased crop yields. Their contribution to food and agriculture is indirect, but nevertheless of immense potential. The value of radiations lies partly in their ability to induce inherited changes in the germ plasm and partly in their sterilizing effects on biological tissues. The ability to induce mutations is being used in plant breeding programs and in other ways, whilst the sterilizing effects have promising applications in food preservation and pest control. The value of radioisotopes in agriculture arises from the ease and accuracy with which they can be identified and measured in extremely minute amounts, which makes it possible to use them as highly refined research tools in so-called tracer studies in a wide range of nutritional, metabolic, developmental and pathological investigations in plants, animals and man. In this way they are giving information which at the present time could be obtained in no other way or only at much greater expense in terms of time and money. Thus, by giving a clearer insight into basic biological processes that have hitherto been obscure, the use of radioisotopes in tracer studies is already leading to greater efficiency and economy in the production and utilization of agricultural products. Bearing in mind that it was only unfettered scientific investigation of the nature of the atom — the pursuit of knowledge for its own sake — that made nuclear energy available to mankind, the potential value of the contributions which radioactive tracer studies can make to food and agriculture may similarly be almost unlimited.

Applications of Radioisotopes in Agriculture and Forestry

Food preservation and storage

Potential food supplies and other agricultural products are subject to heavy losses in all phases of production, distribution and storage through fungal and bacterial infection and the ravages of insect pests, and it is by combatting these that the most immediate and spectacular improvements in supplies can be achieved. No valid estimate of total world losses is possible, but they are undoubtedly of immense magnitude. A very conservative estimate that has been brought forward for losses in stored grain, largely from the depredation of weevils and other insect pests, is 10 percent, but the losses are undoubtedly much greater in the hot and humid areas of the world, where the figure of 25 to 50 percent loss of harvested cereals and pulses which has been estimated for Central America is probably generally applicable in most of the less advanced countries. In addition, perishable foodstuffs such as fruits, vegetables, meat and fish are particularly subject to spoilage in distribution and storage. Similarly the deterioration resulting from fungal infection and the attacks of various insect pests is of major concern in timber utilization.

Evidently there is great scope for the adoption of control measures, and these can be applied relatively easily at a cost which is usually but a small fraction of the value of the returns. Already radiations and radioactive isotopes show promise of making important contributions to the development of improved control measures which would markedly improve the supply situation. Thus the destructive power of radiation has been used to eliminate insect infestations in grain and cereal products at costs which compare favorably with those of the more conventional procedures such as fumigation. The sprouting of potatoes has been successfully inhibited as a result of the effects of radiation on the enzyme system, thus permitting transportation under less stringent conditions than are usually required and extending storage life by many months. Much attention is also being given to the possibility of food preservation through cold sterilization by irradiation at normal temperatures. Whilst full success has not yet been attained, significant improvements in the keeping quality of meat and meat products have been achieved without off-flavors or color changes arising from detrimental side reactions. In some countries, trichinosis is an important health problem and it has been shown that the irradiation of pork can kill or sterilize the trichinae, thus rendering infected meat safe for human consumption.

Evidently radiation may have a very useful field of application in food processing and preservation, although much more exploratory work must be done to evaluate its full potentialities. One of the most attractive features of this application is the wide scope it offers for the useful employment of the radioactive residues arising as a by-product of the operation of nuclear reactors.

Reducing losses in growing crops

Every year a large part of the potential harvest is destroyed by diseases and pests which attack the growing crop. It has been said that, even in such relatively developed countries as the United Kingdom, the work of over 51,000 skilled farm workers is lost each year, and that in the United States of America losses caused by insects, weeds and plant diseases account for losses in farm output equivalent to 13,000 million dollars per year. Most of these losses could be avoided by the timely application of control measures, and radioisotopes are proving to be exceptional tools in studies which are leading to the development of improved materials and methods for safeguarding our harvests. Adequate control of a destructive insect, for instance, generally requires a thorough knowledge of its life cycle and habits, and tagging insects with radioisotopes provides a much more efficient means of determining their flight range, migrating routes and overwintering habits than methods such as painting which were previously used. In Canada, cobalt-60 has been used to label wireworms, making it possible to follow their underground meanderings while, in both the United States of America and Canada, the flight and overwintering habits of a num-

ber of forest insects are under investigation, using similar techniques. These studies will undoubtedly be important factors in better control.

Extremely effective insecticides have become available in recent years but one of the problems associated with their continued use is that insects frequently build up resistance to these poisons. Studies with insecticides labelled with a radioisotope permit comparison of uptake and metabolism by normal insects and by those that have developed resistance. This work may be a step in determining the nature of resistance to the poisons, concerning which so far little is known except that resistant insects take up the poisons just as susceptible ones but do not react to them in the same way.

Similarly radioactive tags are playing an important part in the development of fungicides, insecticides and weed killers, for use either as direct applications or as systemic poisons. These latter are substances which are applied, usually through the soil, and taken up by the plant without harm to it but are toxic to pests feeding on the plant. It is important to know that such substances are not altered in use to products harmful to man or animals. For instance, the weed killer 2-4-D when used to kill weeds in the bean field is readily absorbed by the bean plant also and has been found by the use of labelled material to be distributed throughout the plant together with at least two additional products derived from 2-4-D. It is obviously important in the case of edible plants to be able to trace such compounds and their metabolic products because of their possible effects on the consumer, animal or man, and the use of radioactive labels is playing an important part in the development of safe materials and methods.

Breeding improved crop varieties

Although control of crop pests and diseases by chemicals can be extremely effective, their use involves additional expenditure and usually requires considerable care. Undoubtedly the most satisfactory safeguard, and one that is particularly applicable in the underdeveloped areas, is the growing of crop varieties resistant to the prevalent pests and diseases. The plant breeder has long been engaged in developing such varieties by well-known conventional methods involving selection and hybridization, and has achieved marked success, but this is a never-ending task, for existing varieties do not satisfy all needs and new pests and diseases or new forms of old ones are constantly appearing. In his task of developing disease- and pest-resistant varieties, as well as other improved types with better agronomic characteristics and higher productivity, the plant breeder is already being greatly assisted by the new potent sources of radiation which have recently become available, and their use in this connection may well ultimately prove to be one of the most significant contributions of atomic energy to agriculture. It has long been known that radiations cause heritable mutations in plants and animals. With the advent of atomic energy further kinds of radiations and more potent sources have become freely available for experimental use, and in many countries extensive programs have recently been initiated for crop improvement through irradiation, with a view to accelerating the normal rate of mutation and so increasing the variability available to the plant breeder for selection.

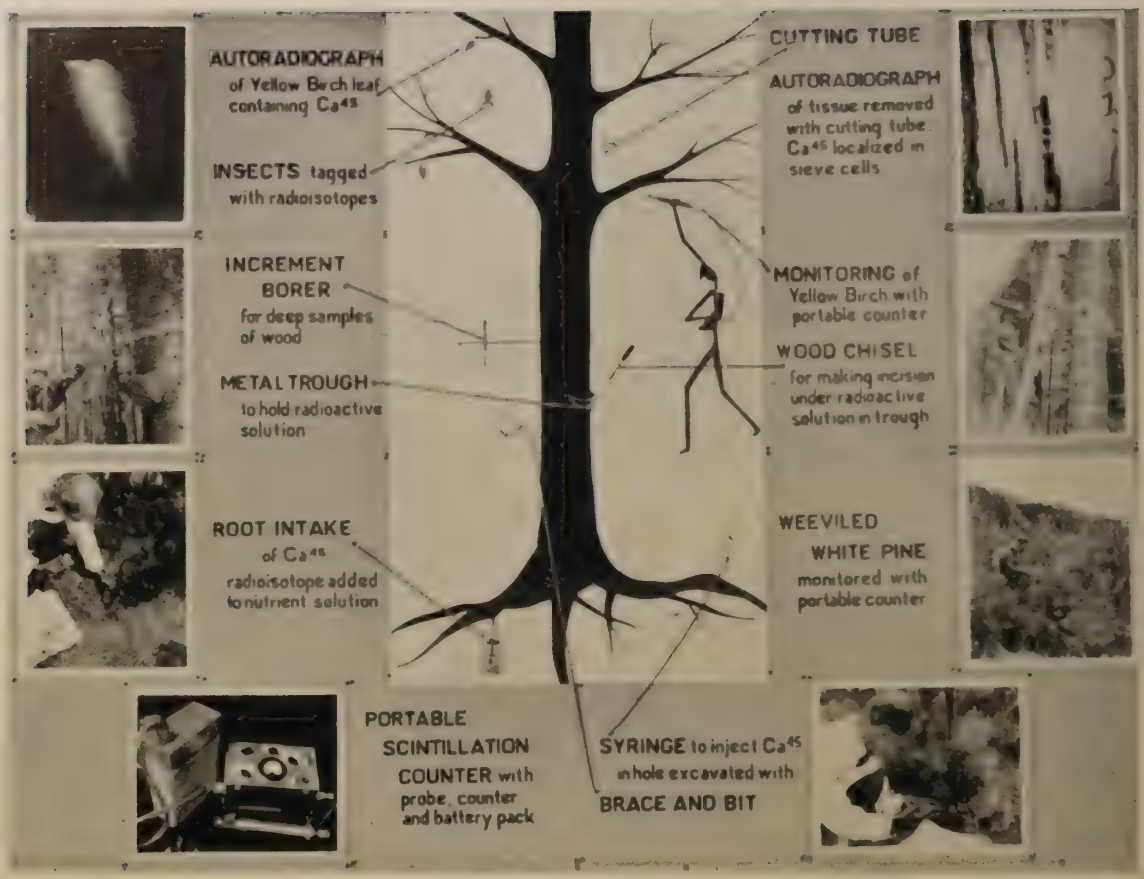
Radiations are applied either in the early flowering stages in order to affect the developing gametes or to seeds in which somatic mutations are first induced, and such affected cells may subsequently give rise to germinal tissue, in which case the mutations are transmitted to later generations. Although, as in the case of spontaneously appearing mutations, the vast majority are deleterious, desirable types occur in low proportion and have been selected in a wide variety of crops. Improved types that have been obtained include higher-yielding or disease-resistant strains of cereals and other crops such as peanuts, stiff-strawed types of cereals resistant to lodging, types better adapted to mechanical harvesting on account of particular size or shape characteristics, types with extended or reduced maturity period, and types with changed ecological requirements, for instance in relation to higher or lower rainfall or soil fertility. An example of a particularly significant outcome of work of this type may be cited from Canada where, amongst some 20 barley mutants produced by irradiation and now under field trial, are some maturing sufficiently early to extend the area in which barley might be grown in that country.

Plants such as some orchard crops which are normally propagated vegetatively are also receiving radiation treatment for the induction of bud mutations. Mutants have similarly been induced in algae and in this way types have been obtained which are adapted to high temperatures and thus more suitable for growth in mass culture. Such types may one day become an important source of food and industrial raw materials. In forestry, increasing emphasis is being given to the breeding of fast-growing types and varieties resistant to pests and diseases, and radiation may play an important role in the production of such improved strains of trees.

In the case of disease control, the ability of radiations to induce mutations in the disease-producing organism itself may also prove to be a tool of exceptional value. Such pathogens as the rusts that affect wheat and oats or the smut attacking maize undergo spontaneous mutations in nature at a rate rapid enough to cause constant trouble for the crop breeder. If he develops, for example, a wheat resistant to black stem rust, he may find that within a comparatively short time a new mutated form of the rust organism appears to which his variety is no longer resistant as it was to the original form. Current work has shown that radiation will produce new races of such disease organisms with increased virulence. By developing these new races artificially and under controlled conditions, the breeder may be able to anticipate the resistance requirements of his crop and to breed adequate resistance prior to the appearance of new strains of the pathogens in the field.

Increasing productivity through improved practices

In addition to the adoption of adequate measures for the control of plant and animal diseases and pests and the use of higher yielding crop varieties developed by the plant breeder, the productivity of land now under cultivation can be increased by the adoption



The use of radioisotopes in forestry research as carried out by the Petawawa Forest Experiment Station, Chalk River, Ontario, Forestry Branch of the Canadian Department of Northern Affairs and National Resources.

of a wide range of improved methods of crop and animal husbandry. Here again, through tracer studies using radioisotopes, atomic energy is making notable contributions to the development of improved techniques through the advancement of fundamental knowledge in animal and plant nutrition and physiology and a better understanding of the complex relationships between animal, plant, soil, water and sunlight on which man is dependent for his existence. The study of such a dynamic biological system is normally particularly difficult and the tracer technique has immeasurably facilitated such investigations. In many cases it provides the only practical approach to the solution of a problem and without it further progress in certain directions would at this time have been impossible.

Soil fertility

The major limiting factors in the productivity of land now in cultivation are the inherent yielding potential of the crops and livestock on them and the amount of nutrients available to enable those plants and animals to produce to their capacity. Contrary to general belief, some of the most productive soils in the world were originally of rather poor fertility and have been brought to their present capabilities by man's careful tending of the soil and the development of various principles of good husbandry, which through the ages have built up the fertility of the soil. The potentialities for increasing production through adoption of those principles on a wider scale are very great. As just one example, the yield of rice in Japan is about four times that of India's one ton per hectare. Much, though admittedly not all, of this increased productivity is due to the much greater use of inorganic fertilizers in Japan, and evidence from experiments indicates that through the use of only a moderate dressing of 30 kilograms of nitrogen per hectare, with other plant nutrients where necessary, India's annual rice production of about 35 million tons could be raised by more than 10 million tons — which would mean much to the welfare of the population and to the economy of the country. However, the present limited use of fertilizers in such countries is almost entirely a question of economics, so that it is essential that the best use is made of the natural fertility of the soil, and that added fertilizers are employed in such a way as to ensure the fullest possible return from them. Here tracer studies with isotopes in many countries are providing a wealth of fundamental information and practical hints. Radioisotopes of most

of the important plant nutrients are now available and they have opened up new avenues of attack on important problems of soil fertility.

The fact that phosphorus is to so large a degree retained by soils in forms that are not readily available for use by plants is one of the major concerns of soil science. Advances in the study of this problem are being made through such work as that in the United States of America with phosphorus-32 and calcium-45 on the factors influencing the fixation of phosphorus in calcareous soils. Canadian workers, who were among the first to point out the advantages of the tracer technique in soil fertility and plant nutrition problems, have shown that the usual procedure for evaluating the contribution of a phosphorus fertilizer by comparing the total phosphorus absorbed by the plant from fertilized and unfertilized plots could be misleading. Before the use of tagged material it was thought that the increased uptake from the fertilized plot all came from the fertilizer. Through the use of radioactive phosphorus it has been found that, when the fertilizer is applied, the plant takes up additional phosphorus from the soil itself as well as from the added nutrient.

Rice, the basic food of nearly one-half of the world's population, is typically grown under irrigation, in submerged soil. In Japan, the radioisotopes of phosphorus, sulphur and iron are being employed in preliminary investigations of the chemistry of such submerged soils, which is quite different from that of ordinary soils, and valuable information is to be expected on the factors affecting the uptake and translocation of these nutrients by rice. Similar work on the determination of the phosphorus fertility status of tropical and submerged soils is under way in India. Other investigations are giving information on the most economic source of specific nutrients and the best placement and time of application of added fertilizers, particularly in relation to the growth period when the plant can best use them and their placing in relation to the main feeding zones of the roots. In this connection a good deal of attention is being given to investigation of the characteristic rooting habits of different plants through use of labelled nutrients, and this ability to define the zones from which particular crops obtain the major portion of their nutrients and moisture requirements should make a valuable contribution to better agricultural practices.

Soil moisture, drainage and irrigation problems

Many other soil problems are amenable to attack by this new tool. It makes possible, for instance, rapid determination of the moisture content and the density of soils, a matter of interest alike to the agronomist, the soil conservationist, and the engineer. Moisture content of the soil may be estimated by a method dependent on the degree of neutron scattering by hydrogen atoms contained in the soil water. A similar method involving gamma rays instead of neutrons is used in measuring the density or degree of compaction of the soil. One application of these methods in the United States of America is the study of the effects of tillage and harvesting machinery in compacting the soil.

A different application to soil problems is the addition of phosphorus-32 or rubidium-86 to surface waters, such as streams or ponds, to determine the rate and direction of drainage into the soil, and to irrigation waters to find out whether they reach the farthest points of the field as well as the nearest points — that is, to evaluate the efficiency of distribution of the water in the soil. Radioisotopes are also being used, for instance in Japan, to detect leakage in irrigation dams and to survey supplies of underground water, and tritium might have a particularly valuable application in large scale research in hydrology, for example over entire watersheds.

Plant nutrition and metabolism

In plant nutrition, the basic mechanisms involved are the uptake of nutrient elements, their transport through cell membranes, and their subsequent translocation or movement throughout the plant. Such mechanisms are of course basic also in the case of animals. Investigation of these fundamental mechanisms through the use of a considerable variety of radioactive elements is under way in many countries. Fuller knowledge of the phenomena involved is essential to the understanding of plant nutrition and growth, and discoveries that were hitherto impossible in this field are now being made. Amongst other practical aspects the mechanism of transport plays an important part in the utilization of growth-affecting or growth-regulating factors — the so-called plant hormones which are used to regulate development in crops, particularly in horticulture — and in the utilization of such compounds as the previously mentioned 2-4-D which are used as weed killers, and the systemic insecticides which are administered to the pest by way of the host plant. An interesting example of the place of such translocation studies in relation to practical problems is the work on mistletoe in Australia, where this parasite is a serious menace of eucalyptus. In work directed towards its control, the isotopes of cobalt, iron and zinc are being used to obtain information on the efficiency of movement of toxic compounds from the host tree to the parasite.

Many of the plant hormones and weed killers are used as leaf applications, and essential nutrients may also be applied to aerial parts of the plant as well as by way of the soil. Thus under certain conditions, especially with trees, temporary deficiencies of such vital elements as iron and zinc may occur, and these can often most readily be corrected by spray applications either in the dormant stage or when in leaf. Radioisotopes have been particularly helpful in demonstrating that some plants can absorb such nutrients efficiently through the foliage and that nutrients so absorbed are rapidly translocated throughout the plant. This principle is already being applied rather widely in practice, urea for instance being used fairly extensively as a leaf spray by fruit and vegetable growers in the United States of America. Additional information on the absorption and translocation of such substances is needed and through the use of urea labelled with carbon-14 it has already been found that crops differ markedly in their ability to utilize this compound as a source of nitrogen, cucumbers using it more than four times as fast, for instance,

as do cherries and potatoes. In the case of strawberries, calcium is readily absorbed, but it has been found that it is not translocated into daughter plants and hence foliar feeding as a major source of calcium is not adequate in this plant.

In Puerto Rico, studies of the formation of *Hevea* rubber are being made in tissue cultures, using possible chemical precursors of rubber tagged with carbon-14. Such investigations should lead to increased knowledge of the basic reactions and mechanisms involved in the secretion of gums and resins and will contribute in the long run to more efficient production of these economically important materials.

Radioisotopes offer a means of determining the rate of movement of water in plants and rather direct evidence of the structural pathways involved. Canadian forests are suffering from a die-back in birch, and radioactive phosphorus and rubidium have been used in the current investigation of the disease. These isotopes have shown that the normal narrow-band upward-spiral path of solution movement is broken in the affected tree and replaced near the dying region by a confused irregular pattern. Although no answer to the die-back problem is as yet forthcoming, it may be anticipated that the new techniques will play their part in the ultimate solution.

Well in the forefront amongst the contributions of radioisotopes to the advancement of fundamental knowledge of plant nutrition and metabolism has been the remarkable progress made through their use in the elucidation of the highly complex mechanism of photosynthesis, the process by which green plants use the sun's energy in the formation, from air and water, of compounds essential to life. Using radioactive carbon, the early principal pathways of this element have been established, and subsidiary pathways and the specific biochemical reactions involved in the synthesis of carbohydrates are being investigated.

The efficiency of energy conversion by photosynthesis is low; probably not more than 1 percent of the total available energy in the sunlight falling on a green leaf is effectively used. This low value arises at least in part from the fact that the process is limited somehow by the plant itself. Investigations are now under way with the aim of identifying the compound or compounds that limit the photochemical reaction. Inefficient though this process is, so far in earth's history it has been the primary source of all food used by men and animals to sustain life, and the source of all our fuels including wood and the fossil fuels, coal and oil — those to which we now refer as conventional fuels in contradistinction to the nuclear fuels of the atomic age.

The remarkable advances that are being made in the understanding of photosynthesis may well lead to important methods of increasing the efficiency of this conversion of energy from the sun into chemical compounds. How much this might contribute to the enlarging of the world's food supply is at this stage a matter of speculation, but the work so far seems to hold much promise.

Another field of investigation of major importance concerns the part played by enzymes in life processes. More detailed knowledge about them is necessary if we are to have a true understanding of the metabolism and the synthesis of organic products. In this field, earlier British work on cell metabolism is being paralleled by Canadian studies on the role of enzymes in the synthesis of sugars and amino-acids in the living organism, while in the United States of America fundamental investigations are under way in the basic mechanisms and the factors influencing reaction rates and the dynamic equilibria characteristic of living cells.

Animal husbandry

Tracer studies are also giving much impetus to investigations on basic problems involved in animal production. As in the case of plants, understanding of enzyme action and other metabolic processes is of prime importance in animal nutrition. Some of the more fundamental investigations concern the amino-acids, which are combined in complex ways to make the proteins of the body. Among the amino-acids essential in the animal diet are two that contain sulphur, methionine and cystine. It is known that cystine can partly replace methionine in animal metabolism. Cows, sheep, goats and other ruminants have the power of synthesizing these amino-acids from inorganic sulphur through the action of micro-organisms in the rumen, or first stomach. It had been thought that non-ruminants, which do not have multiple stomachs, could not carry out this process within their own bodies. But recent work with inorganic radioactive sulphate in the diet of poultry has shown, through the recovery of radioactive cystine, that non-ruminants can also synthesize at least part of the cystine they require, which in turn can partly replace methionine; and hence that inorganic sulphate should be considered an important mineral nutrient for poultry, and for swine also, as well as for cattle and sheep.

Studies on the biochemistry of lactation provide another example of the effective use of tracer techniques in metabolic studies. In such work in the United Kingdom, radioactive carbon and tritium, an isotope of hydrogen, have been used to label dietary components. Isolation of the milk constituents and determination of radioactivity indicates directly which milk components are derived from the labelled source and permits some well-founded speculation as to the metabolic route involved. In a typical experiment, sodium acetate labelled with radiocarbon was administered intravenously to a lactating goat. Analysis of the fatty acids in the milk clearly indicated that the synthesis of acids from the acetate took place in the udder itself, not earlier. Such studies, evaluating dietary components and elucidating the steps by which they pass into the sugars, fats (lipids), proteins, and other milk constituents, should lead to more efficient feeding and management for production.

Radioisotopes are especially effective in studying the efficiency of food utilization because it is possible with this technique to arrive at more accurate values than are obtainable by the usual methods employed in food balance studies, which permit only the determination of the total intake and loss of nutrients from the body. In materials found in the waste it has not hitherto been possible to differentiate those that passed through the intestinal tract without being absorbed from those absorbed and subsequently excreted.

The use of tagged nutrients permits ready identification of the source of the excreted materials and in such investigations in animals it has been possible, for instance, to distinguish endogenous (body) and exogenous (feed) calcium and phosphorus.

As an example, the value of alfalfa as a source of phosphorus for lambs had long been considered, on the basis of the usual evaluation procedures, to be of the order of 20 percent; that is, only one fifth of the phosphorus in the alfalfa was utilized by the body. The tracer technique has shown that the phosphorus from alfalfa is actually far more effectively absorbed, about 90 percent being utilized. The low value previously estimated was due to the fact that phosphorus was being rapidly involved in the body chemistry, and the large amount excreted was not phosphorus from the feed but phosphorus that had been absorbed earlier, used, and returned to the intestinal tract. Studies of this nature on food utilization have been extended to the egg, the fetus and the milk, permitting evaluation of the relative contribution of the diet to each.

All of this newer knowledge contributed by radioisotopes work on the metabolism and nutrition of animals is of major concern for the world food problem since with rising standards of living there is a demand for a higher proportion of animal proteins in the diet.

Just as in the case of crop production, advances in the control of animal pests and diseases and the development of improved breeds also constitute important methods of increasing animal production. In the case of animals, however, experimentation is usually more costly and time-consuming than with plants with the result that, with some important exceptions, the utilization of radioisotopes and radiation has not progressed so rapidly. Thus, whilst irradiation for inducing mutations in plants is being quite widely used for crop improvement, this technique has not as yet been employed to the same extent with livestock nor has it yielded comparable results. Irradiation has also been shown to induce mutations in fungi causing crop diseases, and these mutants are being used in experiments to develop greater resistance to those diseases. It may be expected that this kind of work with animal-disease-causing organisms will have comparable important practical applications. Thus variants of reduced virulence developed by radiation may prove to be of value for use as vaccines in the production of immunity to commonly occurring, more virulent, forms of the pathogen, and irradiation may also be of help in developing polyvalent vaccines. These are possibilities which, though so far untested, may have great significance, since vaccines constitute the most effective way of combatting the many widespread animal diseases which cause losses of millions of animals throughout the world.

A somewhat different use of radiation has been made within a limited area in the case of at least one insect pest of livestock, the screwworm fly (*Callitroga americana* C. and P.), which is responsible for damage to the cattle industry in the United States of America to the extent of some twenty million dollars annually in killed or crippled animals and damaged hides. An ingenious method of control has been successfully demonstrated by the United States Department of Agriculture in co-operation with the Dutch authorities on the island of Curaçao in the West Indies. Large numbers of male flies were bred in the laboratory sterilized by radiation from radioactive cobalt, and released in numbers far in excess of the normal population of males in the area so that females were much more likely to encounter a sterilized male than a fertile one. The female fly mates only once in her lifetime and hence there was no possibility that she would subsequently produce fertile eggs. This unique undertaking was carried out after a close study of the life cycle of the insect, the determination of the susceptible developmental stage and dosage requirements, and careful estimation of the screwworm population of the area. The possibility of eradicating other insects by radiation undoubtedly merits further attention following such fruitful results with the screwworm fly.

Applications of Radioisotopes in Fisheries

The world's fisheries at present contribute over 26 million tons of high-quality food. Although this represents but a small proportion of the animal protein consumed by man, fish is an important element of the diet of many peoples, especially in certain countries in the tropics where proteins of animal origin may otherwise be almost absent from the diet. Up to the present, however, the potentialities of the ocean and inland waters as sources of food have been utilized to only a relatively limited extent but, with the application of modern scientific and technological advances, revolutionary developments in man's exploitation of the world's aquatic resources may be anticipated.

As in agriculture and forestry, radioactive isotopes have many uses in fisheries research, and their employment will accelerate the conclusion of certain investigations which are essential for the evaluation of fishery resources and the understanding of those resources that will permit efficient exploitation. Probably the most important application has been the use of carbon-14 in estimating the productivity of ocean waters. Carbon-labelled sodium acetate has been added to water samples taken at various depths and the samples incubated under controlled conditions. The growth of the phytoplankton or plant life under these measured conditions gives an estimate of the basic productivity of the water from which the samples were taken. The use of this method is rapidly being extended and will contribute significantly to the achievement of a realistic estimate of the basic productivity throughout the seas. The importance of this contribution will be clear since the production from the plant life in the oceans determines the quantity of organic material in subsequent links of the food chains and more particularly in those links that furnish material of economic value to man.

Applications similar to this have been made in fresh-water studies. Radioactive phosphorus has been used in several investigations in fresh-water lakes to study the efficacy of mixing, or the distribution of the phosphorus throughout the water and to the flora and fauna. Recent experiments in Canada have indicated that the turnover of phosphorus in lake waters is much more rapid than had previously been estimated, and further that the rapid turnover under natural conditions appears to be caused primarily by bacteria. This clearly indicates the need for

Professor Gustafsson of the Swedish Forest Research Institute demonstrates the results of a genetics experiment to Dag Hammarskjold, Secretary-General of the United Nations, at the special exhibition organized last summer at Geneva during the world conference on the peaceful uses of atomic energy.

further work, since it had not hitherto been thought that planktonic bacteria play an active part in the phosphorus cycle. On the contrary, the primary organisms involved were considered to be algae, which are highly important in the food cycle of fishes. What contribution, if any, the bacteria make to productivity in these waters is therefore unknown, and it is possible that their high consumption of phosphorus may adversely affect the growth of algae. The importance of radioisotopes in this connection is that they will accelerate the analysis of the ecological systems in inland waters and add precision to the available methods. It may be emphasized that this is especially important in inland waters where the opportunities for human intervention to modify ecological systems are much greater than in marine systems.

Radioactive tags have also been used in fisheries work for tracing and measuring more massive movements of material. For example, they have been employed in studies of the movement and population density of fish, where they have some advantages over the usual marking methods. There is also the possibility that radioactive tags might be used for following the movements of oceanic currents and for measuring water transport in marine systems. Evidently radioisotopes can play at least as great a part in increasing the productivity of our fisheries resources as they can in agriculture and forestry.

Applications of Radioisotopes in Human Nutrition

Reference has already been made to the particular value of radioisotopes in analysing the movements of specific nutrients in a dynamic biological system and the important part that such tracer studies can play in elucidating problems of animal nutrition and metabolism. Much of the knowledge concerning human nutrition and metabolism is gained from animal studies and therefore much of what has been discussed earlier with reference to animal nutrition applies equally in the field of human nutrition. Thus work in progress on the metabolism of amino-acids and proteins in mammals is especially significant in connection with certain deficiency diseases such as kwashiorkor in man. Current studies also include work on the absorption and excretion of fat and cholesterol, which are considered important factors in atherosclerosis, a type of hardening of the arteries.

Use of the tracer technique with human beings is rather limited because of understandable reluctance to submit them to chronic internal exposure to radiation; but such studies are being made in the United Kingdom, the United States of America and France on fat and cholesterol metabolism under normal and abnormal conditions. A limited amount of work has also been done with human beings in the field of amino-acid and protein metabolism, using carbon-14 and radioisotopes of sulphur and iodine. In connection with mineral nutrition, work has been carried out in the United States of America on the metabolism of calcium in young male children.

An excellent example of international co-operation in the study of an important health problem was one involving the use of the tracer technique in an investigation of iodine metabolism in areas of endemic goiter in Argentina where, with the help of radioactive iodine, Argentinian and American doctors made a complete study of uptake and metabolism under conditions of minimum iodine supply. Although the work did not result in any startling new discoveries, it was possible to observe the patterns of iodine metabolism,

the changes imposed by deficiency, and the adaptation of the body to deficiency. In addition, this investigation contributed new knowledge of the dynamics of iodine transfer within the body.

It is evident that tracer studies can make valuable contributions to a better understanding of the physiology of human nutrition. This in turn will affect the pattern of utilization of available food supplies and help in the development of adequate balanced diets which are so important for the maintenance of health and efficiency.

Future Outlook

Research

It is obvious from the foregoing discussion of past and present work that radiations and radioisotopes will play an increasingly important part in research and development in agriculture and related fields. In fact, the vast field of potentialities of the peaceful uses of atomic energy has hardly been touched, and it may be said that the applications of radioisotopes and radiation to problems of concern to agriculture are limited only by the imagination and ingenuity of the investigators.

The adaptability of radioisotopes to such a wide range of research arises from the fact that they may be quantitatively determined in such minute amounts. As we have noted, this makes it possible to introduce an identifiable component into a complex system such as the soil, a plant or an animal, and follow its path to determine its fate in the dynamic system. The techniques involved, however, require carefully trained personnel and a considerable investment in laboratory facilities and instrumentation. Because of these limitations it would be well, for the immediate future at least, to confine the use of this tool in general to those problems in which it is the only applicable method, or to cases in which the desired information may be obtained by the use of isotope techniques with a marked saving in time and effort.

The supply of the more important radioisotopes is now generally adequate for present needs and the rate of progress in research in the immediate future will be determined largely by the number of investigators with the necessary training and experimental facilities. Hence, it will be necessary to make arrangements as rapidly as possible for the training of investigators in the handling of radioactive materials and the research techniques involved. The governments of those countries with experience in atomic energy are already generously making their training facilities available to the nationals of other countries; and the Food and Agriculture Organization of the United Nations, like other international agencies, is prepared to assist in facilitating arrangements on request, and hopes from time to time to be able to award Fellowships for training and research in the applications of radioisotopes to problems in agriculture and related fields. To make the best use of the available knowledge, skill and facilities, it may be desirable to develop co-operative programs of research on the more important problems of general interest. Many of the fundamental investigations using radioactive isotopes can be pursued at any centers with adequate facilities, irrespective of location, but studies of the applicability of the results in specific regions must often be undertaken locally, and here again it is likely that progress will be accelerated through co-operation between neighboring countries.

The encouragement of promising long-term investigations might well be a suitable function of the projected atomic energy agency in consultation with the appropriate Specialized Agencies of the United Nations, which have much experience in stimulating international co-operative investigations where such procedures can lead to more effective use of relatively restricted resources in trained manpower and facilities.

Power aspects

Little reference has so far been made to the potential benefits to agriculture and related industries that may be expected from the more abundant supplies of cheaper electric power that will eventually become available from atomic energy developments, other than to indicate in a broad way the general lowering of costs of production and distribution, and the improvement in the conditions of work and in domestic amenities for rural populations that would result. With the reservation that such benefits must undoubtedly await the widespread application of nuclear power in industry, mention may appropriately be made of some of the further though admittedly still speculative developments that might be possible in agriculture, forestry and fisheries. Although at this stage any discussion of these possibilities may seem to be purely visionary, some reasonable speculation appears to be fully justifiable in view of the spectacular technological advances in the past few decades that have revolutionized the human way of life in less than the span of a generation. Already an atomic-powered submarine is in existence and in some quarters atomic-powered locomotives and aircraft are said to be only a few years away. Much, therefore, of what appears to be fantastic today may be a commonplace tomorrow.

It has already been pointed out that, whilst the reduction of losses due to diseases, pests and spoilage, and the adoption of various improved techniques which lead to more efficient exploitation of areas already cultivated are the most immediately promising ways of increasing production, attention should also be given to the benefits that might arise through bringing new areas into cultivation, although this is a more difficult and expensive undertaking. Probably the greatest contribution in this direction would be through the provision of irrigation facilities, particularly in the desert and semi-arid areas of the world. Many areas suitable for such development exist in North and South America, Africa, Central Asia and North China, to name but a few. There are also areas where drainage and reclamation of marshlands and deltas, especially in the tropics, could render land fit for cultivation, though there are fewer opportunities for this type of action than in the case of irrigation. The availability of more abundant and cheaper power from atomic reactors might well make possible the development of such irrigation and drainage projects. In addition, work is now under way

on the partial desalting of water, and abundant and cheaper power would make it possible to do this on a scale adequate for irrigation. Such applications would be of particular significance to the underdeveloped countries, especially where conventional power sources are deficient.

As in the case of agriculture, in forestry more abundant and cheaper power would have far-reaching implications. It would affect not only the primary, often small, rural forest industries as well as the larger ones, such as the manufacture of pulp and paper, but also forest policy and management in general. For instance, at the present time about one-half of the world's harvest of wood is used for fuel, which forms a particularly important source of energy in rural areas. Past experience has shown that where a more convenient, and sometimes more efficient, source of power is available, the use of wood as fuel drops very rapidly. This may be of advantage or disadvantage to good forest management, according to the circumstances. In areas where wood is scarce and the forests badly abused by destructive harvesting to meet the needs of the population, as in some Mediterranean and Asian countries, the replacement of wood by an alternative source of power would greatly facilitate the much-needed reconstruction of an adequate forest cover. On the other hand, in some regions the use of wood as fuel is often an important factor in good silviculture, offering the sole or one of the few markets for small and rough assortments that would otherwise be unmarketable. This shows the complexity of the problems involved and particularly, in view of the length of time needed to plan and execute changes in forest management practices and policies, explains the unusually keen interest of forestry in the long-time changes in power sources and costs that may be affected by atomic energy developments.

The availability of cheaper power would also make possible the more efficient exploitation of large forest areas and would have a particularly marked effect on the practicability of establishing economically sound and integrated wood industries in the remote and lesser-developed parts of the world. Looking even further afield, it might play a most important part in opening up some of the world's last untapped forestry resources in the tropical areas, particularly in South America and Africa.

Similarly, atomic power could be of considerable significance to the fishing industry, where the development of nuclear power units of a size suitable for installation in ships would be of particular interest for possible use in mother and factory vessels of fishing and whaling fleets operating over long periods at great distances from their bases, especially in the Antarctic, since they might in various ways lead to substantial reductions in operating costs.

This discussion of the possible implications of cheaper and more abundant power for agriculture, forestry and fisheries is by no means intended to be exhaustive but rather to give in broad outline an indication of what atomic energy developments could mean to these industries.

Agriculture is perhaps the most conservative of our arts, but when modern methods of farming and the multitude of highly technical services provided by an up-to-date department of agriculture are compared with primitive nomadic and pastoral systems of food production, it is obvious that the farmer is ever ready to adopt improved methods which increase the efficiency of his usage of land, water, capital and labor. It is therefore reassuring to know that this newest of our scientific advances, atomic energy, can contribute in so many ways to man's oldest industry and thus open up the way to improved methods of feeding, clothing and housing the world's ever-growing population.

The Conference of FAO, at its Eighth Session in November 1955, requested the Director-General to arrange for all FAO periodicals and other documentation of a topical nature to be distributed simultaneously in the three working languages: English, French and Spanish.

The Conference further urged the Director-General to make arrangements whereby this request should be complied with as soon as possible. To permit this in the case of *Unasylva*, it as been decided to make Vol. 10, No. 1, a special issue devoted to a single topic.

As from Vol. 10, No. 2, *Unasylva* will revert to its normal features; and as from that issue the three language versions will be distributed simultaneously.

Multilingual Forest Terminology

by

THE JOINT FAO/IUFRO COMMITTEE ON BIBLIOGRAPHY

A long-felt want in international forestry has been for a definitive multilingual terminology which could provide a ready reference to those terms that commonly occur in literature with a wide international public or that are frequently used at international technical meetings and conferences. A number of attempts have been made to produce such a working tool but no multilingual terminology approved by an international agency has as yet appeared.

The Third World Forestry Congress held at Helsinki in 1949 charged FAO with undertaking the preparation of such a terminology for forestry. It was suggested that initially work should be restricted to seven principal languages, including the official working languages of FAO – English, French and Spanish.

It was early conceded that the carrying out of such a task by FAO would be a time-consuming and expensive undertaking, and that quick results could not be expected. It would also require much effort outside the Organization by the relatively few individuals in various countries who were competent and had the time and opportunity to commit themselves to this sort of work. Moreover, for a period the energies and financial resources of FAO's Forestry Division were fully engaged in projects of a more urgent character.

However, the idea of a multilingual terminology was referred for consideration to the Joint FAO/IUFRO Committee on Bibliography, a body that had been established in 1949 to serve as the instrument through which both FAO and the International Union of Forest Research Organizations would carry out their commitments in respect to all bibliographical matters. This Committee was at that time fully occupied with the preparation of an internationally acceptable system of classification for forestry literature, a project which came near to completion with the publication early in 1954 of an authorized English version of the Oxford Decimal Classification. The preparation of versions in the other official working languages of FAO and IUFRO, that is, in French, German and Spanish, could follow with relative ease after the establishment of the basic English text. This work is now in hand. The German version is the most advanced, and will probably be published in 1956.

At its seventh session at Nancy, France, in September 1954, the Joint Committee felt able to accept the responsibility of co-ordinating the arrangements for compiling a multilingual forest terminology, and advised FAO of the nature of the work that would be involved and of the approximate expenditure that appeared necessary. The Fourth World Forestry Congress, held at Dehra Dun, India, was also informed of, and endorsed, the proposed action of the Committee.

As a result of subsequent negotiations between the Chairman of the Committee and the Director of the Forestry Division of FAO, arrangements were made to put the necessary work in hand.

This broadly involved, in the first place, the wide selection of terms and definitions commonly used in forestry in many languages and the establishment of their exact equivalents in the English language. English was decided on as the basic language because the two most modern forest terminologies existing were in that language, namely the Forest Terminology of the Society of American Foresters and the Commonwealth Forest Terminology which covered the rest of the English-speaking world, the British Commonwealth of Nations and their associated territories.

By the middle of 1955 important initial steps had been taken towards preparing the basic English *corpus* of definitions and terms, as a result of meetings at Oxford between representatives of the Society of American Foresters and of the Commonwealth Forestry Bureau, which is the organizing center for this work. Besides general agreement on principles, some concordance between American and British usages was worked out, a difficult task in itself which will be continued by correspondence and, if necessary, by further meetings. It is hoped that this work can be completed by early in 1957.

In the meantime, the Joint FAO/IUFRO Committee, whose present membership is given below,[1] met at Stockholm in September last and decided on the further procedure for establishing the multilingual terminology, based on the procedures already established by the International Standards Organization and by UNESCO, which has primary responsibility for international endeavors in this field of terminology and bibliography.[2] Details of the procedure agreed on are given below. The successful application of this procedure can be fully assured only on the basis of co-operation between the Joint FAO/IUFRO Committee on Bibliography and language-group or national terminology committees. The early establishment of such committees has been urged by the FAO Conference, the IUFRO Congress and by the Fourth World Forestry Congress. According to the latest information available, sixteen countries have already established such committees and eleven countries are planning

[1] Chairman: Eino Saari (University of Helsinki, Finland). Members: K. Abetz (Universität, Freiburg i. Br., Germany); T. François (FAO); A. Huber (FAO); F. C. Ford Robertson (Commonwealth Forestry Bureau, Oxford, England); R. Rol (Ecole nationale des eaux et forêts, Nancy, France).

[2] Reference is invited to the UNESCO paper 66V/4820 of 20 August 1954 entitled "UNESCO Participation in the Improvement of Scientific Terminology and Lexicography."

them. Language-group committees for French-speaking, German-speaking and Spanish-speaking countries are being arranged.

The following notes give the main outline of procedure for this co-operation and explain how the multilingual terminology will gradually be built up. Once the basic English terminology has been determined, probably in 1957, each definition will have its own *universal reference number* (URN). All the other language terminologies which will each appear in self-contained volumes, will carry the same *universal reference numbers* for the corresponding definitions. In this way an unlimited number of languages can eventually join the system and it will be possible by cross-reference to find the equivalent terms in other languages for any definition appearing in one of the language sections of the whole *Multilingual Forest Terminology*.

1. *General scope*

Each language section of the *Multilingual Forest Terminology* will comprise:

1.1 Terms (with definitions) UNIQUE to forestry
e.g., in English the verbs "brash," "beet (up)"
or else used there in some special sense(s)
e.g., "blaze," "canopy," "(fire) hazard."

1.2 Terms used in forestry, but of widely accepted significance and currency in non-technical language
e.g., in English, "branch," "knot,"
and also all generally accepted COMMON NAMES OF TREES.

1.3 A restricted selection of terms (with definitions) from allied sciences and technology, of frequent use in forestry
e.g., in English "instar," "mycelium," "field moisture capacity" and "topocline."

NOTES: In Class 1.1 the unique terms are few, the others extremely numerous; some, like "stock" in English, have several quite distinct forestry meanings. None of Class 1.2 need be *defined*; trees have scientific names, and adequate definitions for the others should be available in any standard dictionary (e.g., for English, the Concise Oxford Dictionary). This class of terms would probably NOT be found in national terminologies but is useful in multilingual ones. NOTE that a term like "saw" or "knot", while not itself needing definition, may form part of many compounds that do:
e.g., in English "bow saw," "pit saw," "loose knot," "tight knot."

For 1.3, definitions should ordinarily be taken from established terminologies in those fields and their source quoted in *round brackets*; thus (M.V.S.S.) = Multilingual Vocabulary of Soil Science. See also 4.6 (b) below.

2. *Basis of procedure*

The English language, which is represented by two modern terminologies (S.A.F. = Forest Terminology of the Society of American Foresters, and B.C.F. = British Commonwealth Forest Terminology) is being taken as the *basic language* for the *basic terminology*.

3. *Mechanics of preparation*

3.1 A selection of terms and definitions made by mutual agreement between U.S.A. and British Commonwealth representatives will be put on 5 × 8 inch (circa 12.7 × 20.3 cm. or nearest standard size) cards.

3.2 In principle each card will carry only a SINGLE DEFINITION. Exceptionally a definition may be of the alternative/complementary type exemplified by *Germinative capacity* in the *British Commonwealth Forest Terminology Part I;* or, in cases where U.S.A. and British Commonwealth content — and therefore wording — cannot be wholly reconciled, alternative definitions, distinguished by [U.S.A.] and [Cw.], e.g., *Forest cover* or *Fire line;* or, sometimes, both *general* and *specific* definitions (see e.g. *Fire control* in B.C.F.). The corresponding English (U.S.A. and/or Cw.) terms, abbreviations and synonyms will also be given. See 7. below.

3.3 Each card will also carry a SERIAL ACCESSION NUMBER (AN) which is a purely provisional number to be used for international reference pending the allotment of a permanent number (see 3.9). It is to be carefully noted that while *definitions* are accorded serial numbers, terms are NOT; a single term, e.g. *Tree*, may have several definitions and serial numbers associated with it. Synonyms and abbreviations will have NO serial numbers at all.

3.4 Cards will be filled up in a standard form as exemplified below:

FAO MULTILINGUAL FOREST TERMINOLOGY

[1] En **fire, ground* AN 819
≠ No. 826

Any fire that not only consumes the organic materials of the *forest floor, but also burns into the underlying soil itself, as, for example, a peat fire. (Usually combined with but not to be confused with a surface *fire).

FAO MULTILINGUAL FOREST TERMINOLOGY

[1] En **fire, surface* AN 826
= ground fire [India, New Zealand] ≠ No. 819

Any fire that runs over the *forest floor and burns only the surface *litter, the loose debris and the smaller vegetation.

Signs and abbreviations are given at 5 and the full sequence of entries at 7, below.

3.5 These cards will be distributed, probably in several instalments, to all language-groups or national Terminology Committees that are ready to deal with them.

[1] En is the UNESCO abbreviation for English.

3.6 Each such language-group or national Terminology Committee is expected to translate the English definitions literally and, *ignoring the English term(s)*, to decide on the most appropriate terms to fit them in its own language. The following situations may then arise:

3.61 A term may not in fact exist, e.g., for *Seedling year* in B.C.F. The Terminology Committee should then supply a paraphrase or, if so desired, coin or adopt a *new* term for the concept embodied in the English definition, enclosing this term in quotation marks to show that it is a neologism or a loan word (see 5. below).

3.62 A term exists, but only for a concept somewhat different from that given. The Terminology Committee should then qualify, as necessary, the definition supplied, and remit a copy of the modified definition *in its own language* to the Commonwealth Forestry Bureau as soon as possible. (See in this connexion the use of signs $\approx$, $<$ or $>$ and $\pm$ under 5. below).

3.63 The equivalent term in the Terminology Committee's language has a further (forestry) meaning or meanings. The Committee should then draft *in its own language* any further definition(s) of such a term, which they should try to match with other English definitions sent to them. If unsuccessful in finding a match, they should remit a copy as soon as possible to the Commonwealth Forestry Bureau for appropriate action.

3.64 More generally, as an expansion of 3.63, where the Terminology Committee finds, after thorough examination, that a desirable definition (concept) has been omitted from the *corpus* of cards supplied, the Committee should define such desirable concepts *in its own language* and send them to the Commonwealth Forestry Bureau on standard cards (see 3.1 above), in the form and with the detail exemplified at 3.4 above. All such cards should reach the Commonwealth Forestry Bureau by a date to be later determined but probably 1.1.57.

3.65 True synonyms exist (see the sign = under 5. below) in the Terminology Committee's language. If so, a preferred synonym needs to be selected and given its accession number and the other(s) then cross-referenced to it, e.g. *Trunk* —> AN. 3076 (this imaginary number being the accession number (AN) for the definition of *Bole*, the preferred term).

3.7 Each country or language region will thus build up its own terminology card-index for the multilingual terminology, arranging duplicate cards in two sets – one alphabetically by terms (including cards for synonyms and abbreviations), the other in serial order of the accession numbers (AN).

3.8 Languages written in scripts other than the Roman, should add a transliteration according to some widely accepted system and state which system this is.

NOTE: The alphabetical sequence followed should be clearly indicated for languages using modifications or combinations of Roman letters to which a special order is accorded, e.g. å, ø, ö, æ, ä in Scandinavian languages, č, ch, š in Czech.

3.9 The final *corpus* of definitions will be decided by the Joint FAO/IUFRO Committee on Bibliography. Ultimately, before publication, the accession number (AN) will be replaced by a Universal Reference Number (URN) alloted *in permanency* to the DEFINITION concerned, so that it can be traced and identified in any language in which a terminology is compiled.

4. *Points of detail*

4.1 Where a single *term* covers more than one concept or definition, the respective topics should always be indicated in full in *round brackets* (see e.g. *Drift* in B.C.F.).

4.2 All genuine synonyms should be included. A preferred synonym will be *underlined;* a deprecated one "daggered," i.e., †. See also 4.6(*a*).

4.3 Countrywide variants, e.g. a synonym like *Vine* [N. Am.] for *Climber*, should be included, but where different regional *definitions* for a given term exist, include only those of really wide application, e.g. the definition (b) of *Forest squatter* in the *British Commonwealth Forest Terminology Part I* but NOT (b) of *Forest village*. In all such cases the area of currency is to be noted in full in *square brackets*, except for the following abbreviations:

N.Am. (= North America = Canada and U.S.A.)
L.Am. (= Latin America)
U.S.A. (= United States of America)
U.S.S.R. (= Union of Soviet Socialist Republics)
Cw. (= The British Commonwealth of Nations and associated territories)

No colloquial or slang terms are to be included.

4.4 Commonly used abbreviations of terms should be added, preceded by the sign –>←–, and should also be included in the alphabetical sequence, with a cross-reference to their accession number, e.g. d.b.h —> AN 695.

4.5 In all languages having more than one gender, the gender must always be indicated; similarly the part of speech represented by a term should be indicated *where helpful*. See 5. below.

4.6 More generally, each terminology should involve a direct element of regulation and standardization:

(*a*) by inserting as necessary the signs (see 5.) meaning 'deprecated' or 'preferred,'

for both synonyms and abbreviations. See, e.g., under *Savanna woodland* and *Felling, selective* in B.C.F. Part I.

(*b*) by indicating when a given definition of a term is taken from some authority, e.g., a National Standard definition. The appropriate initials should be used in *round brackets*, e.g., (B.S.I.) = British Standards Institution, (D.I.N.) = Deutsche Industrie Norm.

4.7 Illustrations (line drawings) should be included wherever these materially assist the text, e.g. for the parts of a saw blade, resin tapping (Recommendation of the International Conference of Science Abstracting, 1949). Proposals for illustrations additional to those supplied with the English cards should be sent early to the Commonwealth Forestry Bureau.

NOTE: It should be possible for each language section of the terminology to adopt the same set of illustrations.

4.8 Idiomatic *phrases illustrating usage* should be considered for inclusion wherever these will materially assist a foreign reader.

4.9 A separate list of the abbreviations accepted by each language-group or national Terminology Committee should be appended to each language section of the terminology.

5. *Common signs and symbols to be used with terms*

Provisionally, at least the following should be used by *all* Terminology Committees:

Sign	*Meaning*
AN	accession number
† (dagger)	deprec(ated), e.g. an obsolete or semi-colloquial term
underlining (of a term)	pref(erred)
→	see (the cross reference sign)
=	synonym
≈	approximately the same as (near-synonym)
±	used in both broader and narrower senses than
≠	is NOT equivalent to
<	is narrower in sense than
>	is broader in sense than
" "	neologism or loan word
[ ]	regional usage of a term (very local usages are to be omitted)
*	An asterisk is used throughout 1. to indicate that the term concerned is itself defined elsewhere and that it will be helpful to consult this definition; 2. to indicate in a term of more than one word the actual keyword under which it may be found.
cf.	compare
(s.c.)	substantive common
(s.f.)	" feminine
(s.m.)	" masculine
(s.n.)	" neuter
	In languages without genders (s.c.) need be put only where helpful to distinguish from, e.g., a verb.
(vb.)	verb
→←	abbr(eviation)

and in due course:

URN Universal Reference Number

Each Terminology Committee must settle the proper set of initials, etc., to represent the sources used under 1.3 and 4.6 (*b*) above, and intimate these as soon as possible to the Commonwealth Forestry Bureau.

6. *Sample of an English alphabetical index being built up*

Accession number

AN 607 **Catchment (area)** [Cw.] = Drainage area = Watershed [U.S.A.] ≠ AN 4076. The total area draining into a given waterway, lake or reservoir.

608 **Catena**. A group of soils that ...

609 **Cedar-apple**. A globular or kidney-shaped gall produced on ...

— d.b.h. —→ AN 695 (→← for diameter breast height)

681 **Deflocculation** = Dispersion (definition follows here)

704 **Dispersion** (Statistics). The range of variations of the values in a set of ...

— Dispersion (Pedology) —→ AN 681

— † Divide (s.c.) —→ AN 4076

— Drainage area —→ AN 607

— † Water parting —→ AN 4076

4076 **Watershed** [Cw.] = † Water parting [Cw.], Divide [U.S.A.] ≠ Watershed [U.S.A.] in AN 607.

7. *Skeleton of a completely annotated term and definition, showing the sequence which signs and symbols should follow:*

AN 1739 **Freshen** (vb.) (Resin tapping) [Cw.] = ... = † ....; ≈ AN 46 [U.S.A.] < AN 428 ≠ AN 571; →← .... [United Kingdom] † .... The definition is .... (B.S.I.) cf. AN 636 —→ AN 280.

Explanation: The term **Freshen** has the accession number 1739, is a verb, and is used in resin tapping contexts in the British Commonwealth. A preferred synonym is ..., a deprecated one is ...; the term is approximately the same as the U.S.A. term AN 46, is more restricted in meaning than the term AN 428 and is NOT the same as the term AN 571. The preferred abbreviation is ...; a United Kingdom abbreviation is ..., and a deprecated one is ...

The definition follows. It is a British Standards Institute's definition and it should be compared with that of AN 636. See also the definition of AN 280.

In actual fact no one term and definition is likely to require all or even most of these annotations.

The Bermuda Cedar

by Gordon R. Groves
Director of Agriculture, Bermuda

The islands of Bermuda situated east of the main current of the Gulf Stream in the western Atlantic, between 32° 14' and 32° 23'N latitude and 64° 38' and 64° 53' W longitude, can only claim 17 endemic land plants. Of these 17 species, by far the most important is the Bermuda cedar, *Juniperus bermudiana* L. There are, of course, many hundreds of species of plants found growing throughout Bermuda, but, apart from the 17 essentially Bermudan plants, all the others are found in parts of the southern United States and the West Indies or have been introduced to the colony by the hands of man from many sections of the world.

For centuries the Bermuda cedar has been the dominant tree and, although live trees of the species are relatively small in numbers at the present time, the author believes that natural reafforestation of the Bermuda cedar will take place again in certain undisturbed areas. In the sheltered and more fertile valleys the trees of this juniper grew into reasonably good-sized specimens, measuring in the region of 24 inches in diameter and reaching a height of 50 feet or more. On the hillsides and areas having little soil, fully exposed to the Atlantic winds, the trees were much smaller and many of these in such locations can only be classified as scrub cedar. Between these extremes, however, trees of various sizes are seen standing closely together over a large part of the land area. It is estimated that in some of the thickly wooded parts there were approximately 500 trees to the acre. In other places there were perhaps only 100 trees, making an average of between 200 and 300 cedars per acre.

Bermudan development

This thick coverage of trees provided excellent windbreaks and in many cases the dwelling houses were completely hidden from view to passers-by on the public roads. In this connection it is of particular interest to note how the development of Bermuda took place within a forest of juniper trees. It would indeed be difficult to find a similar development anywhere else, with trees standing so close together in the immediate vicinity of the towns and dwellings. Admittedly with so many trees of the same species the effect may have been termed 'dull', nevertheless the cedar provided good light shade and the grass grew freely underneath the trees. This species of juniper is particularly well adapted to the shallow nature of the Bermuda calcareous soils and is able to withstand the wind in exposed positions, hence its great value as primary windbreaks for the protection of the more tender vegetation such as fruit, vegetables and the choice ornamental plants. In addition to these useful qualities, the trees gave each dwelling the desired amount of privacy without many extra plantings of other trees and shrubs. Extreme care was taken to preserve the cedar trees, because they definitely formed the background of the Bermudan landscape. A person building a house on a new site would fell just sufficient trees to make room for the house to be erected, with a narrow clearance to be used as a driveway from the road to the residence. The garden would therefore be formed quickly by leaving all the remaining trees and mowing the grass between them. This gave a neat and tidy appearance with ample privacy, protection from the wind and good shade during the hot summer months. Comparatively little effort was required to develop a garden along these lines. In the case of the arable land, the trees were cleared from areas where sufficient depth of soil was found for the cultivation of vegetables and other crops, but the cedars were carefully preserved round the edges of the small fields for the reasons already indicated.

Historical

The foregoing gives some idea of the landscape of Bermuda when the author first set foot on Bermudan soil 17 years ago. Today a very different story is presented, which will be related below. It is of interest at this stage to delve a little into the history of Bermuda, for the cedar tree has figured prominently in the writings of the colony's historians. When Bermuda was colonized in 1610 the islands were obviously very heavily wooded with *Juniperus bermudiana*. Great numbers of the trees were felled for shipbuilding, and much of it was used as fuel.

By 1627 a law was enacted with the preservation of the cedar trees as its object, but the felling of the trees was undoubtedly continued and little thought given to reafforestation. Early in the eighteenth century wood was being imported for the building of houses and ships. Much of the land at that time must have been denuded of trees, as evidenced by a correspondent in the *Bermuda Gazette* in 1786, who wrote:

> "All these hills and valleys, which were once so beautifully adorned with thriving cedar and which were the admiration of strangers, are now naked and barren wildernesses quite stripped of their pride."

* This article relates to a territory that is relatively very small in area but the story gives an interesting picture of how energetic action, in contrast to apathy, can overcome the effects of deforestation, even though the latter has occurred from natural causes. The article has been published in *World Crops* (London), and appears in *Unasylva* by permission of the Editor of that monthly publication.

The absence of any references to a general reafforestation scheme leads one to believe that no attempt was made to reafforest the denuded areas, but natural reafforestation did in actual fact take place.

Juniperus bermudiana is a typical juniper; its nearest relatives are *J. virginiana* and *J. silicicola*, both of the southeastern U.S.A. It produces an abundance of seed in most years. The seed will take from three to six months, or even longer, to germinate, moisture being the controlling factor. Growth in the initial stages is slow. During the first 10 years of the life of the tree it makes on an average one foot of growth per year. The actual length of life of this cedar has never been accurately determined. One very large tree in the grounds of St. Peter's Church, St. George's, was estimated to be 200 years old when it died a few years ago. A tree measuring 24 inches in diameter was known to be 85 years old because the date of planting was carefully recorded. This tree, however, died during the last five years. Death was attributed to scale insects.

The wood of the tree is generally very knotty, due to its branching habits. It is too irregular in the grain to be of any use as pencil slats. Tests have showed resistance to cutting to be about 14 percent higher than that of *J. virginiana* and about equal to that of *J. procera*. It was tested as pit props, but the wood was found to be too brittle and to break suddenly without warning. Locally the wood is used extensively for furniture making and the manufacture of souvenirs for sale to the tourists. The finished article is highly polished and the reddish-brown hue of the wood adds dignity to the home in which it is used. Considerable quantities of the cedar wood are consumed annually during the winter months for burning in open fire grates to warm the houses during the cool evenings from December to April.

Insect pests

The insect pests of the Bermuda juniper were fully covered in a paper by Waterston (*Trop. Agric., Trin.*, 26, Nos. 1-6, 1949). Waterston lists some 20 destructive insects recorded on the Bermuda cedar up to April 1947. The most important of these pests are the juniper scale (*Carulaspis visci*) and the oystershell scale (*Lepidosaphes newsteadi*), both of which were accidentally imported to Bermuda presumably on nursery stock from the United States.

Before the beginning of the twentieth century the Bermuda cedar appeared to be remarkably free from insect pests. This fact is gathered from the writings of A. E. Verrill (*The Bermuda Islands*, 1902), who remarked: " The cedar appears to be very little affected by insects. " With the advent of more travel to the colony by ship and latterly by air, and a flourishing tourist trade, many thousands of visitors have passed through the colony since the beginning of the present century. This leads to a greater interest being taken in the introduction of new plant life hitherto unknown to Bermuda and with these plants insects obviously come also.

Damage to the cedar trees by insect attack was periodically reported and by 1930 isolated areas of the trees were obviously suffering from insect damage. A scale insect identified as *Acutaspis perseae* was named as the cause at that time. In 1935, two species of mites were reported causing a swelling to the tips of the twigs. An aphid was later on proved to be causing the yellowing of the foliage. Before 1944, few trees had actually died through insect infestation, but in that year trees began dying at an alarming rate, when two new scale insects were found to be causing the death of the trees. The oyster-shell scale was found in the Tuckers Town area at the eastern end of the island and the juniper scale in the parish of Paget in the central part of the colony. These two scale insects spread very rapidly and in the early stages of the attack trees were dead within six months of attack. These insects attack the foliage and the berries, causing rapid defoliation.

From the two original infestations the scales spread in all directions. At the time of writing 90 percent of the trees in the colony are dead. The few remaining live trees are in poor health, but seedling trees in certain areas appear to be in good condition.

Chemical control of the scale insects by spraying was attempted when the cause of the trouble was determined but spraying large areas of forest trees, within the type of development which had taken place in Bermuda, was impracticable and this form of control was eventually abandoned in favor of biological control.

Biological control

In 1947, the Commonwealth Institute of Biological Control was called in to assist in the problem. Dr. W. R. Thompson, Director of the Institute, spent some months in the colony in 1947 to advise on the possibility of introducing beneficial insects to control the two scale insects causing the death of the cedar trees. From 1947 to 1953, the Commonwealth Institute of Biological Control worked vigorously on the problem. During that period some eight species of coccinellids (ladybird beetles) were introduced to the colony from various parts of the world. The Bermuda Government provided funds for the building of a laboratory in California for the purpose of breeding predators and parasites for shipment to Bermuda. The laboratory of the Department of Agriculture in Bermuda was completely rebuilt to house equipment for breeding these coccinellid beetles. During 1949 and 1950 a staff of nine people were employed in the rearing work of the coccinellids for ultimate liberation on the cedar trees. In order to provide food for the coccinellids the oleander scale, *Pseudaulacaspis pentagona*, was raised on potato tubers.

Despite the energetic action of the Director of the Commonwealth Institute of Biological Control and his staff, the destructive work of the scale insects continued.

Although the oystershell scale eventually disappeared, assumed to be controlled by a parasitic fungus disease, the juniper scale spread over the entire islands. Trees in the most westerly parish of Sandys were the last to be attacked. It is thought that, if biological control could have been introduced shortly after the destructive scale insects had been identified, more trees might have been saved. At the time some doubt existed in the minds of the entomologists working on the problem that *Lepidosaphes newsteadi* and *Caru-*

laspis visci could cause the death of these cedar trees. The same scale insects are known in several parts of the world including Europe and America, but no known records of these scales having killed large trees existed. The author has seen juniper trees in the southeastern United States quite heavily infested with the juniper scale, but the trees did not appear to be suffering. Admittedly, the natural enemies of the scales were present in reasonable numbers and it is assumed that the parasites and predators kept the scale at a sufficiently low level to prevent serious damage to the trees. That is what it was hoped to achieve in Bermuda by biological methods. It is for this reason that the author believes that the young Bermuda cedars now growing in parts of the colony will thrive and develop into mature trees. The juniper scale is likely to remain in the colony as a potential source of danger to juniper trees, but the natural enemies will, it is hoped, hold it in check.

The changing scene

Due to the loss of 90 percent of the local cedar trees caused by these scale insects, the Bermuda Board of Agriculture initiated a General Reafforestation Scheme in 1949. In June 1952 the Reafforestation Compulsory Powers Act was passed, which gave the Board of Agriculture power to remove all dead cedar trees within 50 feet on either side of a public road and to replant the cleared areas with suitable trees at Government expense. This Act has recently been amended to take care of all Government lands, an additional 50 feet on either side of the public roads, all golf courses and the islands in the Hamilton Harbour.

The full significance of the loss of the cedar trees to Bermuda can be quickly realized by anyone who knows anything about the tourist trade. Bermuda's chief source of income is derived from the tourist industry and since the second world war the number of tourists visiting the colony has gradually risen from 40,000 annually to over 100,000 in 1954. It is due to the importance of the tourist industry that the Government set out on a vigorous program to remove the dead trees, in the first instance from the most conspicuous places, and to start replanting with a much larger variety of plants.

Such a program involves considerable sums of public money and cannot be achieved quickly. It is a comparatively simple task to fell the dead trees, but other problems present themselves in connection with the disposal of the wood salvaged from these operations. Furthermore, the propagation of suitable trees, shrubs and palms for the planting of about 180 miles of road, government lands and supplying trees for numerous private estates is no small undertaking. Because of the severe winds which sweep the colony it is essential to try to establish good windbreaks with hardy plants, which calls for very large stocks of the right material. Considerable losses of plants have been experienced due to wind and occasional droughts. Again, due to the flourishing tourist trade, there is relatively no unemployment and it is therefore difficult to obtain adequate suitable labor for this reafforestation scheme. To aggravate the position further the whole conception of landscape gardening has had to be changed, because the cedar no longer forms the background to the gardens. Despite all of these difficulties, good progress has been made and the areas which were planted in 1950 are beginning to show up to advantage.

The changing scene seems to describe aptly the gradual change which is taking place, for the loss of the native tree and the work involved in repairing the damage may be likened to the seasonal changes of summer, autumn, winter and spring. The period before 1945, when the whole colony was clothed with a beautiful green canopy provided by the cedar trees, depicted the summer season. Autumn followed throughout the period 1945-50, when large areas of the trees turned brown and died due to the scale infestation, casting a grey-purplish hue over the hillsides. From 1950-55 the winter prevailed, when large areas of the countryside denuded of trees and many dead trees still standing presented a very desolate winter-like appearance. Finally, it is visualized that, as a result of our efforts, aided by nature, to fell the dead trees and replant the denuded areas with young trees, the period 1955-60 will be the springtime when it is hoped the whole countryside will commence to bloom again, thereby completing the gradual change from a landscape mainly comprised of one type of tree to a scene in which a variety of trees, shrubs and palms will dominate the landscape.

Use of cedar wood

It is estimated that only 25 percent of the trees felled produce sound timber. A considerable number of them are less than 12 inches in diameter, many have hollow trunks, others have large sections of decayed wood in the trunks, resulting in a considerable amount of material which is only fit for use as firewood. There is a steady demand for sound timber for local consumption and, of course, fair quantities of firewood are used during the winter months. Even so, an enormous quantity of branches and unsound trunks are burnt on the site during the felling operations. To the conservationist this appears to be an abominable waste of a material which might have a potential market value. The cedar wood has a great appeal to most people when it is used for furniture making because of its very pleasing color. The numerous knots throughout the boards add considerably to its attractiveness.

With these factors in mind and the large annual government expense involved in maintaining the reafforestation scheme, the Bermuda Government has been exploring the possibility of converting this waste material into a saleable commodity. A firm of research engineers of California was called in to carry out some research work on this waste material. It was found that all the material now being burnt on the site of the felling operations, including the thin branches, could be converted into compressed boards of very pleasing design and color. The finished product apparently has a great variety of uses in the form of wall panelling, door making, floor tiling, coffee tables and similar pieces of furniture. The research engineer who carried out the work reported most favorably on the results. The finished product has excellent coloring, is far superior to and much more beautiful in appearance than any other wood on which he has worked.

In simple language, the general process is to pass the raw timber, including the branches, through a machine which breaks the wood into various-sized chips. The dust is sifted out, so, likewise, is decayed material by passing the chips over various sieves. These chips are next placed in trays, where certain plastic binders are added. Under high pressure the chips are glued together, forming boards of varying thickness, from $^1/_4$ to $^5/_8$ inches. The compressed boards may be used with a rough surface or, if required, a polished surface can be quickly obtained by applying a coat of filler to the surface and passing it through a sanding machine. This gives a very highly polished surface. The finished product is sound in every respect and will remain in good condition even in humid climates similar to that experienced in Bermuda. In addition to these compressed boards, very satisfactory sawn veneers can be made by gluing the veneer to the compressed board. This then gives a surface identical to the articles made of solid cedar and has great appeal. The research work proved beyond doubt that the waste cedar wood can be converted into a valuable commodity, but what of the economics?

Finance

To manufacture this product in Bermuda would mean setting up a completely new plant and to do this a capital expenditure of some £70,000 would be required. Before making a decision whether to proceed with the scheme or not, the Bermuda Government naturally wishes to be reasonably certain that, if this product is manufactured in the colony, a suitable market for such a commodity does in actual fact exist and that the price at which the product can be sold would give a reasonable return. Another factor which has to be taken into consideration is that only about 5,000 acres of trees would be available for this project. Is this sufficient for the capital expenditure involved? The engineer who conducted the research work feels that with such a highly valued product it would be well worth while financially to tackle vigorously the project immediately.

Bermuda, having a land area of 20 square miles, and a population of some 37,000 cannot afford to speculate on a project unless it is reasonably certain it will produce a return on the investment. Again, there is relatively no unemployment and labor is difficult to obtain, especially for this type of specialized work. The Government reafforestation scheme is costing approximately £60,000 per annum, and at the present rate of progress at least another five years will be required to complete the work.

As Bermuda is not able to manufacture the machinery and plastic binders required for the project, a considerable proportion of the estimated cost of the scheme would be spent on the importation of these items. The market for the finished product would obviously be overseas, involving considerable expense in shipping charges and port handling. This, together with the high cost of Bermuda labor, would naturally increase the cost of production to a point where it might not be an economic proposition to convert the waste cedar into this compressed wood. Investigations are proceeding on the possibilities of marketing the commodity at a profitable price.

FORTHCOMING FAO MEETINGS

1 9 5 6

27 May - 2 June	France	Sub-Commission on Mediterranean Forestry Problems
September	Argentina	Latin-American Poplar Conference
17-30 October	Rome	Technical Conference on Eucalypts

1 9 5 7

14-25 January	Geneva	Technical Conference on Insulation, Hard-and Particle-Boards
Date not confirmed	Indonesia	Asia-Pacific Forestry Commission (4th session)
..	Rome	European Forestry Commission (9th session)
..	Iraq	Near East Forestry Commission (2nd session)
..	Guatemala	Latin-American Forestry Commission (6th session)
..	France	International Poplar Commission
..	Moscow	FAO/ECE Committee on Forest Working Techniques and Training of Forest Workers
November	Rome	Ninth Session of the FAO Conference

Wood Requirements in the Near East

by FAO Staff

Excerpts from a paper prepared for the recent session of FAO's Near East Forestry Commission held in Teheran, September 1955 and intended to provide a background to discussions on forest policies in the region. The paper was not claimed to be exhaustive in scope but represented an initial attempt to describe the present production and consumption of industrial wood in the region and its neighborhood, and to assess future demand. Only the following countries were taken into consideration for the study: Afghanistan, Cyprus, Egypt, Ethiopia, Iran, Iraq, Jordan, Lebanon, Libya, Pakistan, Saudi Arabia, Syria, Turkey and Yemen.

Of all the regions of the world, the Near East has the lowest percentage of woodlands. It possesses only 44 million hectares, covering some 4 percent of the total area. The following Table gives a comparison with the other regions.

Table 1. – Comparative Forest Areas of the World

Region	Forests, in million hectares	Forests, as percentage of land area	Accessible forests per capita, in hectares
Europe	136	28	0.3
U.S.S.R.	743	34	2.2
North America	656	36	2.0
Latin America	890	40	1.9
Far East	489	22	0.2
Africa [a]	793	33	1.5
Pacific Area	86	16	1.6
Near East	44	4	0.17
World Total	3,873	29	0.7

[a] Excludes Egypt, Ethiopia and Libya, which for the purposes of this paper are included in the Near East.

Only in Cyprus, Iran and Turkey does the forested area exceed 10 percent of the land area. There are vast areas which are completely treeless in the desert and sub-desert regions of Egypt, the Arabian Peninsula, Libya, Syria, Iraq and on the high plateaus, as well as many mountainous regions of Iran, Afghanistan, and Ethiopia.

The wildness of the topography of many parts of the region is shown by the percentage of inaccessible forests. Some 32 million hectares, or three-quarters of all stands are estimated to be inaccessible, thus giving only 17 ares [1] of accessible forested area per inhabitant, as compared with the world average of 70 ares, four times as great. If Turkey and Iran are excluded, the area of accessible forests per inhabitant is reduced to only 3 ares. Virgin stands of considerable extent are today only to be found on the northern slopes of the Elburz in Iran and in the mountains of Turkey, Afghanistan, Ethiopia and in Pakistan. Conifers are mostly concentrated in several countries in the temperate and mountainous zones and consist in the main of various pine species associated with junipers in dryer climates; for the region as a whole conifers account for one-fifth of the forest area currently utilized.

Low as these figures are, they nevertheless still exaggerate the extent of the region's resources. Many of these stands, both conifers and broadleaved, are degraded by overcutting, overgrazing, charcoal burning, lopping and fire, and are therefore thinly stocked with an extremely low volume of standing timber per hectare with a low annual growth. Considerable areas in Afghanistan, Ethiopia, Iran, Iraq, Syria, Turkey, etc., described as forests, are little more than brushwood and coppice and yield only fuelwood and wood for charcoal. Of Turkey's 10.5 million hectares of forests, more than 6.5 million consists of degraded high forest and coppice, so that the effective area for exploitation is less than 4 million hectares. Although Iran records 16 million hectares of accessible forests, only 3 million can be regarded as true forests. [2]

Recent developments have resulted in remarkable changes in the attitude towards forest depletion that has been prevailing for centuries. While formerly little interest was shown in the forests, which suffered severely in consequence, during the past few years governments have shown a growing interest in forestry. Initial steps have been taken to survey forest resources (Iraq, Libya, Syria), to build up or improve forestry administrations, to protect the forests (Ethiopia, Iran, Syria, Libya), to improve their management and exploitation (Pakistan, Iran, Turkey), to provide for the necessary forest research work (Syria, Iran, Pakistan), to extend the forest area and to develop appropriate forest industries (Pakistan). This fortunate and promising development has not yet, however, advanced very far.

[1] are = 100 square meters or 119.6 square yards.

[2] The example of Syria, where detailed information is available, shows clearly that often only a fraction of the officially indicated forested land may be considered as forest. The 449,000 hectares of "forests" are composed as follows:

Category	*Hectares*	*Percent*
Forests	88,000	20
Bare land to be reforested	93,000	21
Shrub land and grazing area	200,000	44
Land registered as forest but not capable of bearing forest	68,000	15

The growing stock in the 88,000 hectares of forest is on average 35 cubic meters per hectare, and annual gross increment does not exceed 1.5 cubic meters per hectare.

As in many thinly forested areas of Europe and the Far East, trees outside the forest are of particular importance, whether on crop-land or in orchards (e. g., apple-tree plantations in Lebanon or olive groves in Syria), for the provision of forage (fodder trees), for improving local climatic conditions for agriculture (shelterbelts, windbreaks), or as various row plantations alongside roads, rivers, and canals. Exact statistics are not as yet available but in order to give an idea of the importance of such trees growing outside the forests, it may be quoted for example that, according to reliable estimates, of the 250,000 hectares of valonia oak in Turkey, 110,000 hectares are on crop-land, and 150,000 cubic meters of sawlogs, 4,000 cubic meters of pulpwood, and 50,000 cubic meters of fuelwood were cut in 1954 in poplar plantations outside the forests. In Cyprus, some 2 million carobs are distributed over 20,000 hectares of cereal crop-land or pasturage, and in Iraq there are about 56 million date palms. The gardens of Damascus (30,000 hectares), where poplars cover some 3,000 hectares, produce more than 50,000 cubic meters of industrial wood. While not all the trees outside the forests are used for supplying industrial wood, some species like poplars, eucalypts, plane trees, acacias, walnuts or cypresses are highly appreciated by the woodworking industries, and pay a particularly important role in providing local handicrafts with the raw material required.

Moreover, some countries of the region have irrigated plantations of poplars and eucalypts around the villages which provide structural timber and fuelwood for local use. Annual growth of these small woodlots is very high and often exceeds 10 cubic meters per hectare, an increment five to ten times greater than that of forests proper.

Economic Prospects

In recent years, governments and private organizations too have made great efforts to develop the natural resources of the region and its industries. Whereas during the first years of expansion and industrialization there was seldom any co-ordinated effort, from 1950 onwards most countries elaborated economic development plans based on local capital and foreign aid. If the goals set in these plans are once reached, a great step towards the rational utilization of the region's renewable resources will have been achieved.

Until now, however, relatively little progress has been made, partly due to lack of capital, lack of skilled technicians, or political conditions, and partly due to bad harvests caused through drought. In very recent years, however, implementation of the development plans has markedly accelerated, and there is no doubt that improvements in agriculture, forestry and industry are more tangible than at any time in the past.

A prerequisite for economic development is a good system of communications. Without roads, highways, bridges, railways, navigable rivers, harbors, etc., economic activity is hampered. It is, therefore, understandable that countries like Aghanistan, Egypt, Ethiopia, Iran, Iraq, Pakistan, Saudi Arabia and Turkey are devoting substantial amounts of the capital foreseen in their development plans to improve their communications.

Agriculture

Except in some oil-producing countries, agriculture is the predominant industry, and therefore most of the development plans give high priority to agricultural improvements. Without an increase in agricultural incomes, the further expansion of industry is bound to be frustrated by the narrowness of its market. An improvement in agriculture is all the more needed because, at best, employment opportunities in the urban areas can be found for only a fraction of the annual increase of population.

Efforts to stimulate agricultural expansion have not yet substantially modified the basic pattern of agriculture in the Near East, in which rather limited zones of highly intensive production, mostly cultivated under irrigation and frequently dependent on export markets, alternate with extensive areas of grain production and with equally large areas of nomadic and seminomadic livestock breeding. The fact that many countries depend for foreign earnings on a few agricultural products alone, and that the prices of these products underwent fluctuations on the world markets, led several years ago to a policy of producing selected agricultural crops which otherwise would have to be imported. Emphasis was first often laid on crops which were relatively easy to expand, such as grain or cotton, but the recent trend is towards the diversification of production through the adoption of more intensive crop rotations, including forage crops, and through the reduction of fallow. The goals set are, therefore, intensification and diversification of land use.

The prospects for these developments are good. In several countries, e. g., Afghanistan, Egypt, Iraq, Jordan, Libya, Pakistan, Saudi Arabia, Syria and Turkey, large irrigation schemes are under way, either by using underground water or by constructing barrages of dams. Several hundred thousands of hectares of unused land will thus be brought under cultivation. The mechanization of agriculture is progressing well, especially in Turkey and Iraq, and the use of fertilizers (until now restricted to high value crops) has increased. Efforts are being made to improve the qualities of cereals and cotton in order to develop new varieties more resistant to drought, blight and rust; the battle against locusts has, in recent years, been more intensively waged. Land reforms have been carried out in several countries and efforts have been made towards a settlement of nomads. It is expected that these measures, together with agricultural credits and technical help to the farmers and peasants, will increase output so that it can at least keep pace with the increasing population.

Industry

Over 50 percent of the world's proved reserves of oil are to be found in the Near East and, since quite a large part of the region has not yet been surveyed, the probable reserves, early in 1953 estimated at some 8,300 million tons, are believed to be much greater. The prospects for the development of the petroleum

industry are therefore good. But there are two points which have to be taken into account for the long-term development of the region as a whole:

1. Petroleum has been found only in some parts of the region and, while a few countries derive great direct or indirect advantages from this natural treasure, the majority have to look for other sources and means for developing their economies and financing necessary investments.
2. In spite of the present favorable prospects for the production of oil, a long-sighted economic policy has to take into account that oil is a non-renewable resource, which will inevitably at some stage be exhausted.

Apart from the oil industry, other industries are not yet sufficiently advanced to withstand unaided foreign competition in the foreseeable future. They suffer, moreover, from the limited range of available raw materials. The absence of coal and iron deposits prevents the development of heavy industries. Even in Turkey, where these two raw materials are to be found, the considerable distances separating them imposes a heavy strain on the iron and steel industry. As regards other mineral resources, the situation is somewhat better. Cyprus, Egypt, Saudi Arabia and Turkey possess several important minerals, such as asbestos, chromium, copper, gold, manganese, phosphates, salt and silver. Afghanistan has large deposits of oil and many minerals including zinc, lead, chrome, magnesium, manganese, copper and also some coal and iron, but very few are worked at present. Other countries in the region also undoubtedly possess minerals, but their resources have not yet been surveyed properly. Raw materials, however, are often of low quality, and the end products manufactured from them are often more expensive than imported goods.

The shortage of trained managers and technicians still retards industrial development. Poor health amongst workers, inadequate nutrition and housing, obsolete machinery and insufficient maintenance have resulted in low productivity, and the low scale of wages in most countries admittedly reduces production costs but also does not raise productivity. Lack of capital has been a major obstacle for industry. Foreign capital until recently has been more or less restricted to the oil industry, except in some instances where large enterprises have been established with foreign aid.

Expansion of industrial production is likely to be much slower than progress in agriculture. But new industries are contemplated in many countries, for example in Iran, Egypt, Pakistan and Turkey, based on agricultural products (especially textiles), forest products, or various minerals. Both public and private capital, as well as foreign aid, are expected to be brought more fully into play.

Future Demand for Industrial Wood

It is obvious that an estimate of the consumption of industrial wood and its products can only be rough. The lack of information on present wood consumption by end-uses and the uncertainty of future economic developments in the different countries hamper any forecast. Nevertheless, some attempt to gauge demand trends is necessary in order to provide a background against which development plans in forestry and forest products can be appraised. The present paper calculates the future demand for industrial wood ten years ahead but this does not necessarily mean that the level of demand anticipated will be reached exactly in 1965. It may be reached either sooner or later, but the general trend is nevertheless likely to remain.

An assessment of the future demand for industrial wood has to take into account, in particular, the increase of agricultural output, of industrialization, building activity and mining, and improvements in transport and communications.

It is obvious that all fields of economic activity will be heavily influenced by the development of the population. About 190 million people are now living in the area under consideration here, and it is a fairly safe assumption that the annual increase in population will be at least 1.3 percent, which has been the trend in recent years. Steady progress in health measures tend continually to lower the annual death rate and increase the live birth rate.

The present consumption of industrial wood per head of population appears to average 0.03 cubic meters for all the countries considered, this being the lowest regional figure in the world. Assuming a future level of consumption not lower than this, it may be said that, on the basis of increase of population alone, an additional 900,000 cubic meters per year will be needed by 1965. But we will examine more closely each field of activity where there is consumption of industrial wood.

Agricultural output

It has already been said that one of the main features of future development will be the expansion of agricultural production. Great irrigation schemes in almost all countries of the region are either in an advanced stage of execution or will be initiated in the near future. The building of dams, as well as other constructional work connected with irrigation, will probably absorb substantial amounts of wood. The same is true, in an expanded agriculture, for various roundwood assortments like posts. In the case of fruit and vegetable production and export, a remarkable upward trend has already been noted in recent years,[3] and it may be assumed that output of these agricultural products will increase still further owing to improvements in cultivation and marketing methods. A number of exporting firms have started to pack their products in boxboards and in paperboard; the wood used for boxboards or board for packaging need not be of high quality, which is very important since many forests in the region at present chiefly produce the lower qualities of timber.

[3] Exports of dates increased from 217,000 tons in 1948 to over 286,000 tons in 1953, i. e. one-third; the same is true for onions. Dry vegetables shipped abroad increased from 50,000 to 75,000 tons. Exports of fruit (lemons, limes, grapes and apples) have risen from 11,000 to 37,000 tons since 1949.

It is estimated that some 750,000 cubic meters (roundwood equivalent) are now used in agriculture and related activities such as irrigation. The main assortments used are sawnwood, boxboards, poles, packing paper and board. An increase of 300,000 cubic meters by 1965 is envisaged, of which some 50,000 cubic meters will be paper and board which will be given separate consideration later. Thus it may be assumed that an additional 250,000 cubic meters, representing an increase of one-third, will be needed for an expanded agriculture in ten years' time, mainly in the form of sawlogs, constructional poles and posts.

Industrialization and building activity

Gradual industrialization, which is at present in its initial stages (except in Turkey, which is already well advanced) forms another of the main features of countries' development plans.

In recent years, building activity has expanded rapidly. The region's production of cement rose from 1.5 million tons in 1947 to 2.9 million in 1953. It doubled in Pakistan and Lebanon, and in Iraq rose from a mere 10,000 tons to 140,000 tons, while Egypt, the main producer in the region, increased its output during that period from 650,000 to over 1,100,000 tons. Statistics of building permits issued are scanty but, where they are available, they indicate that the level of building activity will continue. Egypt is initiating a vast building program, and in Pakistan and Iraq, for example, where industrialization is being introduced at an accelerated pace, or in countries where nomads will be settled, building of houses will be further expanded.

Since 1950, the capacity of electric energy installations rose simultaneously in Cyprus, Ethiopia, Pakistan and Turkey by some 35 percent; production of electric energy rose from 1,330 million kwh in 1950 to some 2,200 million in 1953, that is by 65 percent. Pakistan and Iraq trebled their production.

There is no doubt that, if this development continues, more roundwood will be used, mainly in the form of constructional timber, sawnwood, poles, paper and board; the two last items particularly for packing finished goods. A recent investigation in Pakistan by an FAO Technical Assistance officer has shown that for the main industries some 50 percent more wood will be used when the current development program is fulfilled.

It has been assumed that out of the present apparent consumption of 5 million cubic meters of sawlogs and other industrial wood, at least 4 million cubic meters are being used for building activities such as housing, non-residential construction, etc. It is probable that, apart from the increase in paper and board consumption for packaging, a further 1.2 million cubic meters of roundwood, or 30 percent more than at present, will be needed by 1965 mainly for the purpose of sawnwood, boxboards, plywood and constructional timber. About two-thirds of this additional amount may be in the form of sawlogs, the rest being used for rough poles, constructional timber and for electric lines.

Mining

Turkey and Pakistan, the main producers of coal, increased their output from 1947 to 1953 by one-third, and Turkey's production of manganese, copper and chrome ore rose in the same period from 62,000 tons to 515,000 tons and by over 100 percent since 1950. The development plans for these countries envisage a substantial increase in these products. Consumption of pitprops in mining is at present estimated at about 200,000 cubic meters. Assuming that in ten years' time the output of the mining industry will increase by 50 percent and assuming furthermore that the ratio of pitprops used per production unit will decline, as has been the case in Europe and North America, future consumption of roundwood for mining should amount to approximately 250,000 cubic meters, or 50,000 cubic meters more than at present representing an increase of 25 percent.

Transport and communications

It has already been stated that the development of roads, railways, harbors, and so on, is a prerequisite to economic activity and that in many countries emphasis is, therefore, being laid on the improvement of communications. Telephone and telegraph poles, sawnwood in the form of sleepers or for shuttering and scaffolding, piling, etc., will be increasingly used. Pakistan, for example, is gradually replacing its steel and concrete telegraph and transmission poles (mostly imported) by cheaper wooden ones. On the calculation that, at present, some 250,000 cubic meters of roundwood are used for these purposes, it is estimated that a further 100,000 cubic meters, or 40 percent, will be needed annually in about ten years' time.

Paper and board consumption

Consumption of paper and board (only 1.1 kilograms per head) is now very low and amounts, for the region as a whole, to some 210,000 tons. The rate of literacy is put at 15 to 25 percent.

In all regions of the world demand for these commodities is rising, but in the coming years it is likely to rise most rapidly in those countries where present levels of consumption are low. Popular education is spreading and the demand for newsprint is making great progress. Educational and cultural advance bespeaks ready access to adequate supplies of printing and writing paper. Similarly, economic growth and rising standards of welfare call for larger amounts of packaging and other industrial paper and boards. A recent analysis of the world's pulp and paper prospects [4] has indicated that demand for paper and board, in the next ten years for the region as a whole, may be estimated at some 350,000 tons, or 140,000 tons more than today. Part of this quantity will be manufactured from agricultural residues or bamboo.[5] It is, therefore, assumed that about 70,000 tons of the additional requirements of pulp and paper will

[4] *World Pulp and Paper Resources and Prospects*, UN and FAO, New York, 1954.

[5] In Egypt, a pulp and paper plant with a capacity of 25,000 tons of chemical pulp and 30,000 tons of paper and board will be based on agricultural residues; in Iraq, a 12,000 ton mill is contemplated which will use reeds as raw material. In Pakistan, four projects are either under construction or at the discussion stage; three of these plants will be based on bamboo, straws and grasses. Only one of the plants in Pakistan, and those planned to be built in Turkey, are likely to use wood.

be based on pulpwood and that the demand from this source will consequently be increased by some 200,000 cubic meters.

Consumption needs in 1965

Having briefly reviewed the main components responsible for the future demand for industrial wood and its products, the findings may be summed up as follows: the present regional consumption of about 5.8 million cubic meters will rise by 1.8 million cubic meters, or 31 percent [6], to about 7.6 million cubic meters. The following Table shows, in round figures, the details of this calculation.

TABLE 2. – ESTIMATED REQUIREMENTS FOR ROUNDWOOD, 1955-1965

Roundwood category	Present consumption	Increased consumption through					Consumption around 1965
		(a)	(b)	(c)	(d)	(e)	
	(.... *in thousands of cubic meters* ....)						
Sawlogs	3,500	150	800	—	—	—	4,450
Pulpwood	600	—	—	—	—	200	800
Pitprops	200	—	—	50	—	—	250
Other industrial wood	1,500	100	400	—	100	—	2,100
TOTAL	5,800	250	1,200	50	100	200	7,600

(*a*) Increased expanded agricultural activity; (*b*) industrial activity and housing; (*c*) mining; (*d*) transport and communications; (*e*) higher paper and board consumption.

These figures are very tentative. But they result in the assumption that consumption requirements ten years ahead of industrial wood and its products per head of population will be some 0.035 cubic meters, still several times less than in southern European countries in 1950 (Spain, 0.10 m^3; Greece, 0.11 m^3; Italy, 0.17 m^3; Portugal, 0.18 m^3).

FUTURE SUPPLY OF INDUSTRIAL WOOD

Of the approximately 5.8 million cubic meters of industrial wood consumed annually today, 2.3 million or about two-fifths are imported. An additional 1.8 million will have to be made available annually in about 10 years, since future requirements will probably amount to 7.6 million cubic meters. There exist three sources that can supply this quantity: imports, indigenous forests and trees outside the forests including small-scale plantations. These possibilities are briefly reviewed here.

Increase of imports

From 1946 to 1950 imports steadily increased but have remained more or less stable in the last four to five years. Intakes of sawn softwood, the main commodity imported in the region, slightly declined, whereas paper and board imports increased by some 10 percent, and those of pitprops remained steady.

Apart from the oil-producing countries, most others show an unfavorable balance of payments. Therefore, although imports of industrial wood and its products account, on an average, for only about 4 percent of the value of the total imports of the countries being considered, it is not likely that timber imports will substantially increase in the near future. Moreover, some of the traditional suppliers to the Near East such as Yugoslavia or Romania, have curtailed their exports for some time, and the consequent deficit has had to be covered by other sources, such as North America, which has raised many difficulties, including higher freight rates. It is, therefore, arguable whether the region's additional requirements of industrial wood and its products can partly be met by increased imports and it is safer to assume that the supplementary 1.8 million cubic meters which will be required by 1965 will have to come from indigenous sources.

Increase of domestic production

Many of the Near East countries were long ago famed for their rich forests. Today these forests are few in number and scattered, and their extent is constantly being diminished, so that they properly fulfill neither a protective nor a productive role. Overcutting, destructive cutting, burning, lopping and constant grazing have reached a stage where "forests" are often composed merely of some few poorly shaped trees or bushes per hectare. If these practices were to continue unchecked, prospects for providing additional timber would be nil, and the forests of the region would, in the near future, be unable even to continue to provide the 3.5 million cubic meters of industrial wood they furnish at present.

Fortunately, in recent years, governments and private enterprise in almost all the countries have become more forest-conscious. The main possibilities for taking the fullest advantage of this more favorable attitude to forestry are the following:

(*a*) proper management of existing forests;
(*b*) rationalization of exploitation and utilization;
(*c*) opening up of inaccessible forests;
(*d*) afforestation.

Proper management of existing forests. The existing forests of the Near East are for the most part insufficiently stocked. Fellings have not been kept under control; planting, tending, thinnings, protection from fire, control of pests, diseases and grazing have been undertaken not at all or on an inadequate scale, and the forested areas have been left without an adequate potential growing stock of desirable species under conditions of vigorous growth. Pure coppice may be abundant in places but the percentage of high forests and coppices with standards is often quite insufficient.

Most forest areas in the region suffer particularly from excessive grazing. The number of livestock, compared with prewar, has now increased 14 percent, but the output of livestock products (meat, milk, etc.) has not increased substantially. This is mainly due

[6] A detailed study on the future demand for industrial wood has so far been carried out only in the case of Pakistan (East and West Pakistan). This study envisages a 60 percent higher consumption requirement ten years hence.

to the increased number of goats (38 million in 1938/39 and about 50 million now) and all too often it is the goat which dominates the livestock category.

Forest conservation and management are impracticable until the grazing problem is solved. Grazing within the forest must be regulated and kept under control. This means reducing the numbers of animals, eliminating goats altogether from many areas, and the practicing of seasonal rotation grazing. At the same time, range lands outside the forest must be improved, and fodder production increased through the establishment of permanent pastures and more extensive use of cultivated fodder crops.

If even the existing forests of the region were properly managed, there would be no problem in how to meet the future requirements of industrial wood. Nowadays some 31 million hectares of forests are reported to be in use. Assuming an annual growth of only 1 cubic meter per hectare — a very conservative estimate — it would in theory be possible to cut more than 30 million cubic meters each year. If half of this quantity should consist of industrial wood, the region could be provided with four times as much timber than at present without reducing the fuelwood supply.[7] But before the forests of the Near East could reach such a point, many decades would have to elapse.

But in recent years, more forest areas have been brought under forest management and sustained yield practices for small or larger areas have been introduced. This encouraging development will certainly continue. It must, however, be realised that the introduction of good forest management will not result in any immediate increase in forest output; rather it will lead to some reduction in fellings in order to build up an adequate stock of growing timber in the depleted forests,[8] according to the old proverb "only from wood comes more wood." Proper management will, therefore, have only long-term effects and it may be assumed that for the next decade no considerable additional timber is likely to be made available from the existing forests.

Rationalization of exploitation and utilization. Most countries of the Near East suffer from the lack of skilled labor trained in proper cutting techniques, and logging equipment is insufficient or even non-existent. Trees are cut, for example, at too high a level, and sometimes the cut is made only on one side of the tree which is then toppled over so that the most valuable part of the stem is hopelessly split. Logs are often left too long in the forests and so exposed to decay.[9] According to enquiries made in several countries of the region, cutting and logging losses amount to some 15 percent of the standing volume of the trees felled. By giving the forest workers proper training and providing them with adequate tools and logging equipment, about a third of these losses could be avoided immediately. It can conservatively be estimated that at least an additional 100,000 cubic meters of industrial wood could in this way be saved annually.

Most of the existing timber industries (especially the sawmills) are insufficiently equipped or dispose of only obsolete machinery and unskilled labor or, in many cases, do not reach even the handicraft stage. The result is an excessive amount of waste which could be avoided. Yields in sawmills seldom exceed 40 to 45 percent whereas, through improvements, it might be as high as 60 percent. The modernization of sawmills would take some time, however, as this is only possible through substantial capital investments. But developments, especially in Turkey, Iran and Pakistan, the main producers of sawnwood in the region, show that a start has been made towards rational utilization, and it may be expected that in the next decade this development will at least continue. Production of sawnwood in the region amounts now to about 1.9 million cubic meters in roundwood equivalent. It is assumed that through improved working methods, the yield may, in ten years' time, go up 45 to 50 percent, in this way indirectly increasing the amount of wood available by another 50,000 cubic meters at least.

The amount of timber used can also be economized by preservation. The main assortments in the region which are suited for impregnation, apart from sleepers and pitprops are different sorts of poles, used especially for telegraphs and telephones. At present, wood preservation is seldom applied and mostly in a primitive way. The life of timber could be lengthened by at least 50 percent if modern preservation techniques were to be used widely. Again Turkey, Iran and Pakistan are making big efforts to introduce modern wood preservation plants and, taking into account other countries also, it is assumed that in about ten years' time, 100,000 cubic meters of properly impregnated industrial wood will be used in the region. In the light of the extended durability thus afforded, this would mean that an economy of about 50,000 cubic meters annually could be effected.

It is, therefore, concluded that by savings made through rational exploitation and utilization, the region would be able to dispose of an additional supply equivalent to 200,000 cubic meters of industrial wood annually in about ten years' time.

Opening up of inaccessible forests. Owing to topography and lack or inadequacy of transportation facilities, there are in the region about 12 million hectares of forests which are classed as inaccessible, of which Ethiopia alone accounts for more than one-half and Iran for one-fourth. Substantial areas are also to be found in Pakistan, Turkey and Afghanistan. Although a part of these forests is located in high mountains and consequently to be considered primarily as protective forests, many tracts that are certainly capable of being worked consist of very valuable coniferous and broadleaved species. The opening up of such forests would require sub-

[7] A Technical Assistance report dealing with the present situation in Syria points out that the forests, having now an annual growth of only 1.5 cubic meters per hectare, will yield three times as much when modern forest management practices are introduced.

[8] In Iraq, the annual cut is expected to be reduced by a quarter, due to recently issued regulations on control of cutting and transport of forest products.

[9] The disastrous practice of charcoal-burning by taking only the branches of the trees and leaving the stems unused, as practised in Iran, is a striking example of unrational utilization.

stantial investments to construct the necessary transportation facilities. But the remarkably large sums already earmarked in countries' development plans to improving the general transportation systems, should be of great help in this direction.

Several countries have already begun systematically to open up their inaccessible forests and plans exist to continue this at an accelerated pace.[10] It is, therefore, assumed that, out of the 12 million hectares of forests nowadays estimated as inaccessible, at least 10 percent will come into use in the coming decade. The annual cut on a sustained yield basis should be at least 2.5 cubic meters per hectare, about one-fourth of which would consist of industrial wood, so that in ten years' time an additional 800,000 cubic meters of timber should be available for the future needs of the region.

Afforestation. As stated before, the percentage of land supporting forests in the region is only 4 percent, being by far the lowest in the world, and many so-called forests are so depleted that they cannot be restored by silvicultural methods alone. Both improvement and extension of the forested area are badly needed. There are many marginal lands not properly suited for agricultural purposes which could be made available for afforestation, although this would involve careful consideration of the relation between forestry and agriculture interests if the most were to be made out of their mutual interdependence. Tree-planting on bare land is also possible in many parts of the region.[11]

In Jordan, Libya and Turkey alone, it is planned to afforest 65,000 hectares between 1953 and 1957, an average of 13,000 hectares yearly. If this average is maintained in the future, these three countries alone will have extended their forest area by 130,000 hectares in 1965.[12] Although no details of afforestation plans of other countries are at present available,[13] it may be assumed that, for the region as a whole, at least some 250,000 hectares will be planted during the next ten years. Part of this planting will be done with quick-growing species, and it may be estimated that the annual growth will average about 5 cubic meters per hectare, thus adding about 1.25 million cubic meters to the annual growth of the existing forest. Even though afforestation can yield only a relatively small increase in wood production over the short term, that is before 1965, quick-growing species can be brought to yield small-sized industrial wood such as constructional poles, pulpwood, pitprops and fencing wood, even in 5 to 8 years' time. Afforestation is therefore estimated to give about 100,000 cubic meters in 1965.

Tree planting outside the forests

Agricultural output in the region is largely limited by adverse natural conditions, such as the widespread lack of moisture caused by the low incidence and uncertain distribution of rainfall, and winds. These adverse conditions can, in part, be mitigated by appropriate forms of tree planting, shelterbelts and windbreaks. Even though trees cannot increase the amount of moisture precipitated, they can help to distribute it more evenly. Trees can also provide shelter from winds which increase transpiration and decrease the growth of agricultural crops. This is especially important where cultivated areas border the great deserts and dry alluvial plains. Furthermore, trees in quantity have a definite influence in modifying local climatic conditions. Extremes of temperature are reduced, atmospheric humidity increased and evaporation rates lowered.

This influence of trees on agricultural output brought about by simple plantations, small woodlots or even greater shelterbelts, has long been recognized in the Near East, and one of the characteristics of countries of the region is the small-scale plantation (mostly poplar) to be found on irrigated land near a village.

These trees already provide quite a substantial amount of industrial timber and fuelwood. There is, however, no doubt that much more could be done, especially on marginal irrigated lands. A tree cordon laid around the whole irrigation area in the Nile valley, for example, where crops of high value border the desert, might substantially increase agricultural production by tempering the inflow of hot winds into the lands.

All such tree-planting outside the forest could provide substantial quantities of industrial wood[14] in a relatively short period, as most of the species used (poplar, eucalyptus, casuarina, dalbergia, tamarisks, ash, plane, robinia, etc.) are quick-growing and afford a valuable yield even after 5 to 10 years. If the introduction of tree crops on agricultural land were undertaken at an accelerated pace, it is estimated that about 700,000 cubic meters of industrial wood could be produced in 10 years' time.

Estimated additional supplies

The findings of the arguments above may be summed up as follows: although a series of good agricultural crop harvests may enable some countries to increase

[10] In Turkey about 50,000 hectares of inaccessible forests were brought into use from 1947 to 1952 and another 185,000 hectares were planned to be made accessible between 1953 and 1957. Forest exploitation in East Pakistan is being developed at an accelerated pace, and in Iran the forest service intends to improve the transportation system in the virgin forests of Masenderan.

[11] The semi-tidal coastal strips in Iraq and Iran could be afforested with mangroves, areas where for the moment there is no wood at all. Xerophylous and halophilous species with modest climatic and soil demands, as saxaul (*Haloxylon persicum*) for instance, can be planted even in desert areas.

[12] In Libya, the Government has recently established a twenty-year program for forestry including afforestation and dune fixation, thus securing the necessary stability for long-term development.

[13] At the inauguration of a "tree plan" in Egypt in spring 1953, it was stated that during that year a million trees would be planted throughout the country, and another 30 million during the following five years. The plan aims at producing within the country sufficient timber to cover all Egyptian requirements.

[14] The fact that in Iran, during 1950-1952, an annual average of about 400,000 cubic meters of industrial roundwood was taken from trees outside the forests, illustrates the extent of these possibilities. The approximate figures for Jordan and Syria are 2,000 and 35,000 cubic meters respectively.

their imports of sawnwood, pulp and paper, the balance of payments of most countries as well as the presumed export availabilities from the region's traditional timber suppliers confirm that, on the whole, timber imports are not likely to increase substantially during the next decade. The figure of additional requirements arrived at earlier, 1.8 million cubic meters of industrial wood, should, therefore, be met from indigenous production. A tentative estimate seems to show that this quantity could be forthcoming through the following means:

	Cubic meters
Rationalization of exploitation and utilization	200,000
Opening up of inaccessible forests	800,000
Afforestation	100,000
Tree planting outside the forests	700,000
TOTAL	1,800,000

INTERNATIONAL UNION OF FOREST RESEARCH ORGANIZATIONS TWELFTH CONGRESS, OXFORD 1956

The Twelfth Congress of the Union will be held in Oxford from 7 to 14 July 1956. After the close of the Congress on the 14th, members will be able to participate in one of the series of study tours arranged in northern Scotland, central and western Scotland, southern Scotland, northern England, eastern England, southern and southeastern England, west and southwestern England, and North Wales. An inclusive price will be charged for each tour.

The Congress follows immediately after the 5th General Assembly of the International Union for the Protection of Nature which will be held in Edinburgh from 20 to 28 June, and which will be followed by tours lasting until the beginning of the week following. There will be a gap of only a few days between the Assembly and the Congress and it will thus be possible for those interested to attend both functions.

Program of Congress

All meetings of the Congress except plenary sessions will be held in the Imperial Forestry Institute which will be placed at the Union's disposal by Professor Champion.

Friday, 6th July, 1956
- Arrival of members in Oxford.
- Registration.

Saturday, 7th July
- Registration of members (continued).
- Opening of Congress.
- Meeting of International Council.

Sunday, 8th July
- Morning - free.
- Afternoon - local excursions.

Monday, 9th July
- Morning - meetings of sections 11, 22, 25.
- Afternoon - meetings of sections 21, 31, 41.

Tuesday, 10th July
- Morning - meetings of sections 23, 24, 32.
- Afternoon - meetings of sections 11, 22, 25.

Wednesday, 11th July
- Morning - meetings of sections 21, 31, 41.
- Afternoon - meetings of sections 23, 24, 32.

Thursday, 12th July
- Alternative excursions to Alice Holt Research Station, Forest Products Research Laboratory, Princes Risborough, or Rothamsted Experimental Station. A charge will be made to cover the cost of these excursions.

Friday, 13th July
- Final meetings of sections.
- Meetings of study groups.
- Meeting of International Council.

Saturday, 14th July
- Plenary session.
- Close of Congress.
- Departure of members on study tours.

Committees

A Reception Committee has been formed under the Presidency of the Earl of Radnor, Chairman of the Forestry Commission.

The Organizing Committee, which is responsible for the general preparations is composed of Sir Henry Beresford-Peirse, Professor Champion, Mr. Macdonald and Mr. T. R. Peace.

A Ladies Committee is being formed under the Chairmanship of Mrs. Champion.

Enrolment

Each member will pay a subscription fee of £3.10s., which will entitle him to receive a copy of the proceedings of the Congress. Ladies accompanying members will each pay a fee of £1. Applications for enrolment forms should be addressed to the Secretary, Organizing Committee, 12th IUFRO Congress, Forestry Commission, 25 Savile Row, London, W.1. before 30 April, 1956.

Commodity Report

Pulpwood and Pitprop Supplies, 1946-1955

The first postwar decade has seen a remarkable expansion in world economy. In the war-ravaged areas recovery has been more rapid than was once expected. In areas remoter from actual operations, where industrial output had already risen during the war, the transition to peacetime production was relatively smooth and industrial output continued to rise. The political changes which followed the war resulted in many countries, including former dependent territories, taking important strides along the road to industrialization. In all, world industrial production (excluding China, the Soviet Union, and Eastern Europe) is estimated to have risen from 83 in 1946 to 137 in 1954 (1948 = 100).

This substantial rise in industrial output does not seem to have been accompanied by anything like a commensurate increase in the total forest output. From 1946 to 1955, reported world fellings rose by only 16 percent (Table 1). However, a steadily rising proportion of the harvested wood has been used industrially, so that over the same period the output of industrial wood rose by 35 percent. At the same time the pattern of end-use underwent a marked change, so that, whereas the volume of sawlogs produced rose by 25 percent and pitprop output by 21 percent, pulpwood production rose by no less than 79 percent. Output of pulpwood has alone kept pace with the rise in industrial production generally, and may perhaps have exceeded it. Other roundwood categories have fallen far behind. The pulp industry today absorbs 20 percent of all industrial wood produced, against 15 percent a decade ago (Table 1).

Though pitprop supplies have increased least, even a 21 percent rise is striking when it is seen that over this period the world's hard coal output has remained remarkably stable. Slightly less than 1,500 million tons in 1948, and rather more in 1954. The answer lies partly in the changed geographical pattern of hard coal production. United States coal output fell from 583 million tons in 1948 to 381 million tons in 1954, a decline attributable mainly to increased utilization of fuel oil for heating and rail transport. Over the same period, European coal output rose from 500 to 600 million tons, while production in the Soviet Union increased from 200 to 364 million tons. The decline in United States output did not seriously affect the level of pitprop consumption, since mining in the U.S.A. is based largely on the use of non-wood props. In the Soviet Union and Europe, coal production continues to be based primarily on the use of wooden mining supports. It is the growing requirement of the Soviet coal industry that has been mainly responsible for the increase; in most European countries there have been serious efforts to effect economies in timber use and there is a definite trend towards the substitution of wooden supports by metal props.

The geographical disparities in the development of pulpwood consumption are less conspicuous. Over the decade there has been a progressive and almost general expansion in the consumption of pulp products, and world output of wood pulp has almost doubled. The fact that pulpwood supplies have increased by only three-quarters may be ascribed in part to the increasing utilization of wood waste as pulping raw material in all the main pulp producing centers. At the same time, steady improvements in pulping techniques have led to economies in the utilization of pulpwood per ton of pulp produced. But while this is true for nearly all the individual qualities of pulp produced, it has not brought about any decline in the over-all pulpwood/pulp ratio, since the pattern of pulp output has at the same time been steadily changing. The proportion of chemical to mechanical pulp has increased, and more and more pulp is produced in bleached qualities. Both these trends imply a reduced pulp yield in relation to wood consumed.

It is now generally accepted that the current rise in pulpwood demand is no transient phenomenon. Increasing industrial output, rising literacy and rising welfare all indicate a greater consumption of pulp products, and efforts are everywhere being made to mobilize greater amounts of the world's ample resources of fibrous materials to satisfy this need. The measures being taken vary in accordance with local

TABLE 1. ESTIMATED WORLD PRODUCTION: ALL ROUNDWOOD, INDUSTRIAL ROUNDWOOD, PULPWOOD AND PITPROPS[1]

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955[2]
	in million cubic meters									
Total roundwood removals	1 290	1 310	1 325	1 310	1 355	1 410	1 420	1 450	1 505	1 510
Industrial roundwood	615	635	685	650	695	750	765	790	840	850
Pulpwood	92	107	119	115	124	147	150	148	157	165
Pitprops	33	30	34	35	35	37	41	38	39	40

1 See also FAO *Yearbook of Forest Products Statistics 1955.* — 2 Provisional estimate.

TABLE 2. — WORLD PRODUCTION OF PITPROPS

Region	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955 [1]
	in million cubic meters of roundwood									
Europe	15.0	13.2	14.6	14.6	13.9	14.5	17.1	14.2	14.6	14.8
Soviet Union	8.0	9.5	10.0	11.5	13.0	13.6	14.2	14.8	15.2	15.5
Canada	0.8	1.2	1.0	1.0	0.4	0.5	1.3	0.6	0.6	0.6
United States	5.1	1.9	3.9	3.1	3.1	3.1	3.0	2.9	2.6	2.5
Latin America	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6
Africa	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4
Asia	2.2	2.5	2.5	2.7	2.9	3.7	3.8	3.8	3.8	3.8
Pacific Area	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
TOTAL	32.7	29.9	33.7	34.6	35.2	37.3	41.4	38.3	38.9	39.5

[1] Provisional estimate.

possibilities, but in general there has been a steady broadening of the raw material base of the pulp industry alongside a more effective use of the forest crop. The increased utilization of wood waste for pulping has already been mentioned, and this is parallelled by more rational methods in the forest itself; for example, pre- and post-logging cleaning operations help to salvage considerable quantities of small-sized roundwood for the pulp mills, while in many countries more efficient thinning practices enhance the mills' material supplies. New pulping techniques make possible the more extensive use of coniferous species formerly neglected, while in nearly all of the major pulp-producing countries increasing use is made of hardwoods.

The pressure of demand for pulp products on pulpwood supplies is being felt more and more heavily in the traditional pulp-producing centers. At the same time increasing interest attaches to the potential resources in those areas where pulp industries as yet exist only in embryo if at all, since it is in these regions that pulpwood requirements are likely to undergo the most rapid relative increase in the coming decades. Frequently these resources consist of non-traditional, and sometimes of non-wood, fibres. Technically, their suitability as raw material has in most cases now been well established. It is the economic mobilization of these resources, and notably of the mixed tropical hardwood forests, on which interest will probably center in the coming years.

Pitprops

World production of pitprops seems to be close on 40 million cubic meters (Table 2). Of this total, Europe and the Soviet Union each account for around 15 million cubic meters, all other regions together accounting for only a quarter of the world total. Soviet production covers the needs of the coal industry in the constituent republics, but in Europe many of the leading coal-producing countries depend on external sources of supply to satisfy a large part of their pitprop requirements. The proportion of European pitprop production entering the international market has varied during the past decade between 16 and 27 percent. In most of the principal coal-producing countries pitprop production has remained fairly free from fluctuations, the general trend being upwards. Output in the principal exporting countries has, however, undergone several sharp changes. In fact, a discussion of world trade in pitprops resolves itself into a discussion of the intra-European pitprop trade, since generally speaking all other regions and countries cover their requirements from indigenous sources.

A complicating element in the pitprop supplies and trade picture is that pulpwood supplies and trade follow a very similar pattern. Large quantities of small-sized roundwood cross European frontiers every year. Much of this roundwood is equally suitable for pulping and for use in mines. The proportion of pitprops to pulpwood in the trade fluctuates in accordance with the relative strength of the demand for these two commodities. A heavy demand for pulpwood, with consequent higher prices, may in a given year curtail the pitprop supplies available; in the following year, the need of importing countries to replenish their pitprop stocks may bring prop prices back to a competitive level, effecting a sharp recovery in the pitprop trade.

Hence, though European production during the period 1946 to 1955 in no year fell more than 10 percent below or rose more than 17 percent above the average for the decade (14.6 million cubic meters), intra-European trade recorded a high of 5.18 million cubic meters in 1952 and, in the following year, a low for the decade of 2.54 million cubic meters. In spite of fluctuations, this trade seems to be on the whole declining in volume. Most consuming countries are able to look increasingly to their own forests for small-dimensioned timber. Thus the volume imported by Belgium, France, the Netherlands and the United Kingdom has gradually declined over the decade, and this decline has been only partly offset by increased imports on the part of Western Germany and, more recently, Hungary. In Germany, increasing pressure on domestic supplies of small-sized roundwood by the pulp industries has compelled the coal mines to look abroad for their pitprop supplies.

There have been some notable changes also in the relative importance of the various supply sources.

Throughout the period Finland has been the leading supplier, and exports from that country have been consistently high. Only demand fluctuations have been responsible for year to year variations in the quantities shipped. Swedish exports have tended to rise; here the increased output of small-sized roundwood in southern Sweden, where the pulp industry is not as yet as highly developed as in the north, has forced producers to seek outlets for their timber on foreign markets. In the early post-war years, Germany was an important source of supplies but today Western Germany is a heavy net importer. Exports from Austria rose up to 1952, but have since fallen as domestic pulpwood requirements have sharply increased. Export availabilities may be expected to continue to decrease in the coming years. Similarly Poland, which exported varying amounts between 1949 and 1954, will probably disappear as a significant source of pitprops for Western Europe as growing domestic requirements absorb the resources available. French export availabilities arise primarily in southwestern France. When internal demand lags exports rise, and vice versa.

The two most significant changes, however, have been the decline in Canadian and the rise in Soviet exports to Europe. In the immediate postwar period Canada was one of Europe's principal suppliers, but imports from that source have gradually declined, save for the peak import prompted by special circumstances in 1952. Canada still remains an important potential source of supply. The wood is there, and assuming the market were firm enough to bear trans-Atlantic freights (and no problems of payments intervened), more would undoubtedly be shipped. Thus Canada exercises a remote control on the European pitprops market, just as she does on the sawnwood market. A more immediate factor, however, is the supply from the Soviet Union. With the passing of the first phase of postwar domestic reconstruction, exports from the Soviet Union have steadily returned towards their prewar level. Today, the Soviet Union ranks second only to Finland in provisioning European coal mines with imported pitprops.

An interesting feature of the pitprop trade in recent years has been the tendency of the coal industries to content themselves with holding lower stocks (in relation to requirements) than formerly. The high level of stocks at the end of 1952 reflected a reaction to the difficult supply situation in 1951 rather than any real increase in needs. While improved mining techniques and economies in the use of wood may have helped to reduce the level of stocks judged necessary from an operational standpoint, the situation probably reflects general confidence in the continued stability of the pitprop market in Europe.

Pulpwood

In spite of widespread war damage, direct and indirect, to the pulp industries of Europe, the Soviet Union and large parts of Asia, the world output of pulpwood at the end of the war stood already 10 percent higher than the immediate prewar level. This was the consequence of the rapid expansion during the war of the North American pulp industry, where pulp output had doubled. Since 1946, pulp production has continued to expand almost uninterruptedly in all parts of the world. During the decade under review European pulpwood output doubled, and in 1955 exceeded the prewar peak by one-quarter. Production of pulpwood in the Soviet Union also rose in 1955 to one-quarter over the 1938-9 level; this represented a sixfold increase in pulpwood output during the postwar decade. At the same time, the remarkable expansion in North America continued, and pulpwood production in that region rose from 61 million cubic meters in 1946 to 91 million cubic meters in 1955. These developments, alongside a sixfold increase in Asia (mainly Japan) and smaller increases in other regions, brought total world production up to around 165 million cubic meters in 1955 (Table 3), or just about double the average of the immediate prewar years.

Alongside this rapid expansion in world production of pulpwood, some interesting changes have been taking place during the last twenty years; and especially in the postwar decade, in the pattern of raw material supplies for pulp. In the early days of wood pulp production the main raw material was spruce, but technical advances have brought about a rapid

TABLE 3. – WORLD PRODUCTION OF PULPWOOD

Region	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955[1]
	in million cubic meters of roundwood									
Europe	28.1	30.3	35.5	36.6	36.2	41.4	49.7	45.4	50.3	53.0
Soviet Union	2.0	3.3	5.0	5.5	6.5	7.5	8.3	9.0	10.0	11.5
Canada	27.4	30.0	30.1	28.5	31.0	36.3	33.9	32.1	33.8	34.0
United States	33.2	40.9	45.8	41.2	45.7	55.6	51.2	53.7	54.8	57.5
Latin America	0.4	0.5	0.6	0.7	0.9	1.1	1.3	1.3	1.4	1.5
Africa	—	—	—	—	0.1	0.1	0.1	0.1	0.2	0.2
Asia	0.9	1.1	1.3	2.2	3.2	4.4	4.8	5.9	6.3	6.5
Pacific Area	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6
WORLD TOTAL	92.3	106.5	118.7	115.1	124.1	146.9	149.8	148.0	157.4	164.8

[1] Provisional estimate.

increase in the utilization of pine. The rise in sulphate pulping has been based on the use of pine. More recently, pitch precipitation methods have been evolved and successfully applied which permit the use of pine for mechanical pulp and newsprint, and a number of newsprint plants based on pine are already operating in the United States. Apart from conifers, more and more temperate hardwoods are also being pulped. This development is not restricted to those areas where native conifers are scarce, though naturally the usage of hardwoods is greater in such areas. In Italy, hardwoods account for 70 percent of all pulping raw materials; in Western Germany, for 25 percent. Already in 1952, the United States was using 14 percent hardwoods, and this percentage is expected to rise to 19 by 1960 and to 26 by 1975. Apart from naturally occurring broadleaved species, there is an increasing use in many parts of the world of fast-growing species grown in artificial plantations — poplar, willow, eucalyptus, and so on. A fact of economic significance, especially in countries where natural forests are scarce or inaccessible, is that whereas the average annual growth per hectare for coniferous species in the northern regions is from 1 to 2 cubic meters, plantation poplars under favorable conditions will produce 10 cubic meters and eucalypts from 10 to 20 cubic meters

Tentative steps have been taken in pulping mixtures of tropical hardwood species, though so far no major plant of economic size based on this source has been projected. However, the conviction is growing that a solution to the economic problems posed by tropical mill developments is only a matter of time.

Apart from the more catholic deployment of species, great strides have been taken in the last ten years in utilizing wood waste in the pulp mills. One of the limits to this development lies in the need to have the material available for collection at low cost. It is natural, therefore, that most progress has been recorded where the mechanical woodworking industries are concentrated geographically and consist of large-sized units.

Rising world pulpwood production has been parallelled by a growth in international trade in pulpwood, though the market has undergone some heavy fluctuations in the postwar decade. Except for a setback in 1949, the volume of exports rose rapidly from 1946 to reach a peak of 11.6 million cubic meters in 1951. After that, the market slowly adjusted itself to the consequences of the Korean War boom, and the volume of trade in 1955 is likely to reach, and perhaps exceed, the 1951 peak.

The longer term prospect for pulpwood supplies available for trade is not altogether reassuring; indeed, it is the belief that pulp products consumption, and with it pulpwood requirements, will continue to rise that has in part engendered the search for non-traditional materials. So far Finland, Europe's leading pulpwood exporter, has maintained her shipments, while Sweden, for reasons explained earlier, has managed to increased her exports of pulpwood. But in both these countries current plans for expanding pulp manufacture will make heavy calls on the resources available and it is by no means certain that Scandinavian shipments can be maintained at their present level. Canada is the world's leading pulpwood exporter and, while most of the shipments are destined for its neighbor to the south, the country's resources could permit an increased contribution to European needs. So far Yugoslavia has maintained its exports, mainly of broadleaved species, while in recent years growing quantities from Poland and Czechoslovakia have also helped feed the European demand. The resumption, on a fairly substantial scale, of pulpwood exports from the Soviet Union in 1955 has been greeted with satisfaction by pulpwood importing countries in Western Europe.

Outside Europe, the only substantial flow of pulpwood trade is from Canada to the United States. While this has fluctuated heavily during the last decade, in accordance with changes in United States demand, it has to be borne in mind that the North American situation is very dissimilar to that in Europe. In Europe the main pulpwood importing countries may rely on imports for half or more of their total requirements; in the United States imports account for but 10 percent of total requirements. Moreover, the United States pulp industry has regular and well-established relations with Canadian suppliers, often having large forest leases in Canada. Thus the North American market is relatively less sensitive to market fluctuations that do occur from time to time.

In Europe, the pulp producers are tending to hold greater operational stocks of pulpwood, especially in importing countries, where bitter experience has shown how smooth running may be endangered if stocks are low and new supplies not readily available.

Prices

A study of the development of prices for smallsized roundwood over the last seven years reveals several interesting features (see Table 4). Except for the violent swing of 1951-2, a movement in which all major commodity prices shared, export prices of both pulpwood and pitprops have remained remarkably stable. Indeed, their level in the autumn of 1955 was in neither case far from the price level ruling in 1948. This is in marked contrast with the movement in sawnwood export prices. The latter also soared in 1951 and fell back in 1952, though the cycle was less marked than in the case of roundwood, and the downswing relatively much less pronounced. Today, however, sawnwood prices on the export market are back to their 1951 peak — almost double the price ruling in 1948-49.

A variety of factors have contributed to this disparity. Roundwood, of course, requires a lower expenditure of labor than sawnwood, and can more easily absorb increases in labor costs. The demand side of the market consists of relatively few large units — coal mines and pulpmills — and is in a better position to influence the course of prices than the many thousands of relatively small sawnwood traders who must compete against each other for preferred qualities. The demand side is further strengthened by the fact that, so far as the main importing countries are concerned, dependence on imports is more marked for sawnwood than for small-dimensioned roundwood. Finally, in the short run, the supply of roundwood is more elastic than the supply of sawnwood. The

TABLE 4. – AVERAGE OR APPROXIMATE EUROPEAN PRICES FOR PULPWOOD AND PITPROPS

	1948	1949	1950	1951		1952	1953	1954	1955
				Jan.	Nov.	June	Jan.	Jan.	Sept
	in U.S. dollars per stere								
Export prices f. o. b. in Northern European countries:									
Pulpwood, spruce, half-barked	12.00 to 14.00	8.50 to 10.00	7.00	10.50	19.50	12.50 to 14.90	5.00 to 10.50	10.50	11.50 to 11.75
Pitprops	9.00 to 10.00	6.50 to 8.00	6.00 7.00	9.00	18.50	12.50 to 13.50	9.50 to 10.00	9.00	10.90 to 11.50
Domestic prices in France:									
Pulpwood [1]	4.00	4.00	4.50	6.50	11.50	11.50	11.00	11.00	1.00
Pitprops [2]	5.00	5.00	5.00	6.00	7.00	10.50	10.00	9.00	9.00
Domestic prices in Western Germany:									
Pulpwood [3]	7.00	7.00	6.00	6.50	9.00	11.50	13.00	9.00	13.50
Pitprops [4]	7.00	7.00	7.00	7.50	9.00	11.00	12.00	8.00	12.50
Domestic prices in Switzerland:									
Pulpwood [5]	14.50	14.00	13.00	15.50	15.50	17.00	17.00	17.00	17.50
Swedish wholesale export prices for:	in Sweden krone per standard								
Sawn softwood 2 ½" × 7", u/s, redwood [6]	620	615	788	1.223		1.101	1.100	1.158	[7] 1.230

[1] Price at the point of departure, excluding taxes, controlled price. — [2] Props of 1st category, price at the point of departure, controlled price. [3] Average price in State forests, in Bavaria, spruce, unbarked, hauled. — [4] Average price in State forests, in Bavaria, spruce, under 15 cm. thick, long pitprops, barked, unhauled. — [5] Average purchase price, pulpwood 1st class, spruce, barked, free on wagon at a station of normal gauge railway. — [6] Yearly coverage. — [7] August.

price trends in 1950-52 would seem to contradict this, but at that time there was a frankly speculative element in the market; in normal year-to-year transactions, the statement holds good.

Perhaps one further factor cannot be wholly discounted. Domestic users of roundwood in the roundwood exporting countries are not anxious to see export prices get out of hand, with inevitable repercussions on the supply and cost of their own raw material. Thus, in certain exporting countries, government action has not been lacking to supplement counsels of moderation designed to avert a repetition of the events of 1950-52.

It has to be remembered that small-sized roundwood is a premium commodity in international trade. Exporting countries have to balance the exchange-earning power of roundwood exports against the raw material requirements of domestic industry. The latter are constantly growing so that, so far as the traditional European exporters are concerned, the upper limit of export availabilities should fall in the long run. On the other hand, this trade flow cannot be obliterated so long as importing countries demand roundwood in exchange for goods essential to the economy of the exporting countries.

Prospects

Rising coal production in Europe is not likely to lead to any expansion in the volume of pitprops traded. The trend towards metal mine supports, and increasing domestic production of small-sized wood, make it doubtful whether European trade in pitprops will even maintain its present level.

Pulpwood requirements in Europe, as in all other regions, will continue to grow, and availabilities will set a limit to the volume traded. An indefinite expansion in supplies cannot be looked for from the northern countries, but Western European pulp industries will welcome any additional supplies that can be obtained from the Soviet Union and, providing no payments problems arise, from Canada. Meanwhile, the present trend towards the utilization of hardwood, and efforts to make the maximum use of waste wood, will continue. Outside Europe, the world pulpwood market is likely to be limited to the established flow from Canada to the United States and, potentially, to imports into Japan. In all other areas, current and prospective pulp expansion plans are likely to be based on domestic fibre resources; sometimes non-traditional wood species, sometimes agricultural residues (straw, bagasse), bamboo and annual plants such as reeds.

The Work of FAO

European Forestry Commission

The Forestry Committee of the Eighth Session of the Conference of FAO, as described earlier, discussed the regional activities of the Organization. Introducing the subject of regional activities in Europe, Sir Henry Beresford-Peirse (Deputy Director-General, Forestry Commission, United Kingdom), as Chairman of FAO's European Forestry Commission, recalled that, shortly before the 1953 Conference of FAO, a joint meeting of the Timber Committee of the United Nations Economic Commission for Europe and of the European Forestry Commission of FAO was held at Rome. This meeting was asked to draw conclusions from the Secretariat study *European Timber Trends and Prospects* and put forward recommendations for the consideration of the two parent bodies.

Representatives at the meeting concluded that, since it was the deliberate policy of all European Governments to make the fullest use of natural resources, timber should be maintained in the important role that it had traditionally played in Europe's economy. Over the short-term, this involved increasing forest output through a variety of measures, many of which were fortunately already being applied in different countries, and increasing imports of sawn softwood. In the long run, it meant extending afforestation and improving forest management in order to provide against the anticipated long-term increases in consumption. Specific recommendations were accordingly addressed to Governments.

Since then, the European Forestry Commission had held its Seventh and Eighth Sessions, in November 1954 and October 1955[1] respectively. It seemed to the Chairman highly gratifying to be able to say that substantial progress has been made in these two years along the main lines agreed by the joint meeting.

> "I think that I should also say a few words on governmental participation in our meetings as a very promising development has occurred on the occasion of the Commission's last two sessions. In addition to representatives from 18 Member Governments of the region, we have had the benefit of the collaboration of observers from the U.S.A., the Soviet Union and six other eastern European countries. I wish to draw your attention to this particular point for it is my personal belief that the larger the participation of foresters in our activities, the wider the exchange of experience will be and the more fruitful the results that our common efforts will be able to bring about."

The examination of the forest policy progress reports submitted by Member Governments in the period under review had revealed that forest services were continuing their efforts to apply forest policies in line with those advocated by the Commission. Important measures had been taken to this end in several countries, such as revised statements of policy, adoption of new laws, adjustment of management to economic conditions, integration and rationalization in the wood-using industries, intensification of research and wide dissemination of the results, measures for guaranteeing workers a certain stability of employment and improving their living and working conditions, quicker vocational training, and development of information and advisory work.

The joint meeting had recommended, in 1953, that national felling statistics and forecasts should be submitted annually by Governments to the FAO Secretariat, that countries should re-examine their allowable annual cut and explore the possibility of increasing fellings by the various methods suggested in the timber trends study, and that national forest inventories should be brought up to date at suitable intervals. From the data submitted by governments on the occasion of the Commission's Seventh and Eighth Sessions, in spite of their incompleteness and diversity, it was possible to note a rising trend in the output of industrial wood. This first encouraging response was accompanied by another positive proof of the possibility of a future increase in the output of timber from the European region. Recent forest inventories often revealed marked increases in growing stock and growth, that had in some countries already led to an increase in actual felling possibilities. It was premature to draw any valid general conclusion, as some countries still had to limit the cut in order to build up the growing stock, but it was nevertheless a step forward towards a more dynamic European forestry.

In the field of afforestation and reforestation the joint meeting had recommended that governments should make every effort to expand as much as possible their programs for afforestation, reforestation and forest improvement, as plans at that time in Europe were still one-third short of the desirable goals suggested in the timber trends study, while there appeared to be still 8 million hectares of idle land not covered by any plan. This matter was given attention by the Commission's working party on afforestation, which had also met twice since the 1953 FAO Conference. The reports of the working party clearly showed that afforestation and reforestation work and other forest rehabilitation operations in reporting countries were proceeding at a satisfactory pace: over 850,000 hectares had been afforested or reforested in the last two years; more than 80,000 hectares of new plantations had been established outside the forest; and 80,000 hectares had been improved in the same period. In total, an area of over 1 million hectares. This satisfactory rate of development was to be ascribed to the existence o well-conceived long-term planting programs.

International Poplar Commission

Since one of the main aims of the International Poplar Commission is that of increasing timber resources, in particular through the establishment of plantations outside the forest, and in view of the fact that the majority of its Member Governments are European, it may be appropriate to report briefly here on its activities since the last session of the FAO Conference in 1953.

[1] The Seventh Session was fully reported in *Unasylva* Vol. 9, No. 1. The Eighth Session was held at Rome 10-15 October 1955, when the following member countries were represented: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and Yugoslavia. A U.S.A. observer was present, and also observers on behalf of ECE, from the U.S.S.R., Bulgaria, Czechoslovakia, Eastern Germany, Hungary, Poland and Romania. J. Keller (Switzerland) and W. Plym Forshell (Sweden) were Vice-Chairmen and the Rapporteur was J. Foxa Torroba (Spain). R. Fontaine (FAO) was the Secretary.

This Commission's Eighth Session was held in Spain in April 1955 and was attended by representatives of 16 governments. On this occasion Argentina, Egypt, Iran, Iraq and Syria were unanimously elected members of the Commission; unfortunately the formal application for membership submitted by the Government of Pakistan was received too late to be taken into consideration during the session. Yugoslavia is planning to set up a National Poplar Commission and Canada a Poplar Committee that may subsequently be transformed into a National Commission adhering to the International Commission. All this is a clear indication of the ever-increasing interest all over the world in this very versatile genus.

The Commission has decided to extend its scope to cover wood-producing willows. Other decisions made by the Commission at its last session related to rules of nomenclature and registration of poplar names, statistical methods used in carrying out experiments, introduction of poplar wood as a special heading in import and export trade classifications, and surveys of the extent of damage caused by *Dothichiza populea* to poplar plantations and nurseries and of methods of controlling it. The preponderant influence was underlined of the site on the suitability of poplars for a given use. The poplar study undertaken by the Commission's Standing Committee will be published in French in the near future.

Special problems

Reverting to the discussion at the Conference of FAO, the Chairman had some words to say about the investigation made by the European Forestry Commission into small woodlands and about the activities of its permanent working party on torrent and avalanche control (already reported in *Unasylva* Vol. VIII, No. 4).

The management of small woodlands was discussed during the last two sessions of the Commission, giving rise to a valuable exchange of experience in this field. Practically all Member Governments were already making determined efforts to solve the difficulties arising from forest fragmentation and the special problems of owners of small woodlots when it comes to practising sound forest management. The Commission, however, thought it advisable to make clear recommendations that these efforts should be sustained to make sure that proper treatment is accorded to small privately-owned woodlands, which are of particular importance in Europe. Consolidation of holdings and coo-perative grouping of owners were regarded by the Commission as the most appropriate means of achieving progress.

The European Forestry Commission and the Timber Committee of ECE decided in 1954 to set up a joint committee on logging techniques and training of forest workers, which met in Paris in December 1955. A number of study groups have already met to discuss the following subjects: working methods and performance; mechanization of wood operations; handling and transport of timber in mountainous areas; forest workers' training, health and safety; bibliography and terminology in work science.

Technical assistance

The part played by the European region in the Expanded Technical Assistance Program was also covered in the Chairman's summary of regional forestry activities for the period 1954-55. Four Member Governments had in this period the services of 9 experts; 26 Fellows had completed their Fellowship studies and 5 more were studying or about to take up their studies. Various items of equipment had been provided for demonstration purposes in connection with the assignment of experts. In September 1955, a number of the experts who had earlier served in Yugoslavia, about 30 Yugoslavian foresters or other counterpart personnel, as well as representatives of the FAO Forestry and Agriculture Divisions, took part in a meeting that was held at Dubrovnik, to review the forestry technical assistance activities in Yugoslavia since 1951 and make recommendations concerning the follow-up work.

Of the 125 technicians employed by FAO as forestry experts on approximately 200 ETAP assignments from 1951 to September 1955, 95, or 75 percent, were recruited from 13 European countries.

Near East Forestry Commission

An event of considerable importance in FAO's work during 1955 was the holding of the first session of the Near East Forestry Commission at Teheran, 24 to 29 September 1955.

Delegates from 11 countries participated in the session, and observers were present from Pakistan, Sudan, Turkey, and from the following agencies: United Nations, League of Arab States, International Poplar Commission, U.S. International Cooperation Administration, World Federation of United Nations Associations and International Union of Forest Research Organizations.

The Commission elected Mahmoud Zahir (Iran) as its Chairman, and Suleiman Higiazi (Libya) and Tesfa Bushen (Ethiopia) as Vice-Chairmen, with Malek Basbous (Lebanon) as Rapporteur. J. Moser, FAO Regional Forestry Officer, was the Secretary.

The Chairman later attended the Conference of FAO at Rome in November and, reporting on FAO's activities in the Near East Region, had this to say:

"FAO took on a tremendous task in 1949-50, when the first sustained efforts were made by the Director of the Forestry Division and his staff to focus the attention of Governments in the region on the importance of forestry in the Near East, and to awaken an active forest consciousness.

"Many people must have felt very sceptical at the time, including even those who were already trying to instill the idea that something should and could be done in the Near East for the cause of forestry.

"If we look back over the past few years, I do believe that both we, the representatives of Member Governments, and FAO, can feel satisfied with the progress made. If I say this, it is because I can already see, in past achievements, the seeds of even more substantial progress.

"The first point upon which Member Governments of the region and the representatives of the Forestry Division of FAO were agreed, was the advisability of convening a Near East Forestry Conference to assess the over-all situation and appraise the means for its improvement. As you know, a first regional forestry conference was held at Amman in 1952, thanks to the very generous invitation of the Government of Jordan.

"The Amman Conference was able to define sound foundations for the future activities in the region of both the Forestry Division of FAO and of Member Governments. Forestry activities in the Near East since then stem almost exclusively from recommendations made at Amman. In other words, I wish to underline the continuity in the forestry work carried out in the region, as I believe continuity to be essential if our efforts are to bring about worthwhile results.

"As the present Chairman of the Near East Forestry Commission, to whose first session my Government had the honor of being host at the end of last September, I was very pleased and encouraged to learn from the progress reports on forest policy submitted by practically all the 14 participating governments, that quite remarkable progress had been made since the Amman Conference, along the main policy lines suggested on that occasion: protection, rehabilitation and improvement of existing forests, mainly for soil and water

conservation purposes; afforestation of bare land and establishment of row plantations, windbreaks and shelterbelts of rapid-growing species, for the twofold purpose of protecting agricultural crops and supplying raw materials. Initial steps have been taken by some countries to survey their forest resources, to build up or improve their forest administrations, to protect and extend the forests and improve their management and exploitation, and to provide for the necessary forest research work.

"One must admit that this fortunate and promising development has not yet advanced very far, and the Commission, at its first session, agreed on a number of measures to enable progress to be accelerated. In particular, it drew the attention of Member Governments to the inadequacy of existing legislation for the settlement of ownership disputes, and for securing a satisfactory supervision of privately-owned forests; the lack of a clearly defined policy on which to base the segregation of forest land from agricultural land; the inadequate knowledge of the extent of rights of usage; and to the insufficient staffing of forest administrations.

"The progress in forestry made as the results of the initiative of Member Governments has been helped by the technical assistance that some of them have received from FAO and under bilateral programs. Since the 1953 Conference of FAO 15 FAO experts have served in 6 member countries in the following fields: forest policy and development, forest products, afforestation, forest grazing, forest research, aerial photography, forest botany and ecology.

"It is also worthy of mention that FAO organized a useful Seminar on Forest Policy at Istanbul in September 1954, which was attended by senior forest officers from eight countries; and that 19 Fellows from Near Eastern countries have completed their studies, are studying, or are about to take up their studies abroad.

"The technical assistance work performed by FAO foresters in the Near East should not, however, be allowed to overshadow other work carried out in the region. The Near East Poplar Conference (Damascus, April 1954), was attended by representatives from seven Near East countries and from five Member Governments of the International Poplar Commission. It enabled the local technicians and some of the outstanding poplar experts in the world to examine jointly the state of poplar cultivation in the region. This exchange of experience made it possible to define the policy that should be adopted to improve and foster this culture, and to specify the technical problems to be specially studied. Four Near East Governments have now become members of the International Poplar Commission and their experts will therefore be able to continue the exchange of ideas, materials or techniques started on the occasion of the Damascus Poplar Conference.

"I think that you will all agree that the provisional Arab Forestry Terminology, produced by FAO as the result of the extremely courteous and efficient collaboration of several Arab foresters, is to be considered as a milestone in the history of forestry in the Near East. The present version contains approximately one thousand technical terms in English and French with the corresponding translations and definitions in Arabic...

"I do not have the time to list all the activities of FAO in the Near East region, and especially those of the Regional Forestry Officer. I would like to draw attention to some of the technical publications of FAO prepared with special reference to the Near East, such as *Handling Forest Tree Seed, Tree Planting Practices for Arid Areas, La carbonisation du bois,* and *Le chauffage au bois.*

"At the start I said that one can already see, in these past achievements, the seeds of even more substantial progress. The future is in our hands, in the hands of all of us here and especially in those of our colleagues in the field, who certainly expect us fully to understand their difficult problems and to devise means of overcoming them. They certainly look to us for a word of hope. So what lies ahead of us is a challenge, and I hope it may also be a reward."

ECE Timber Committee

The Timber Committee of the United Nations Economic Commission for Europe held its thirteenth session in Geneva from 13 to 17 September 1955 under the chairmanship of F. M. du Vignaux (France). J. O. Soederhjelm (Finland) and J. Kaczerginski (Poland) were re-elected as Vice-Chairmen. All the major timber exporting and importing countries of Europe participated, including the Soviet Union, and also Canada and the United States. A feature of the meeting was the increasing number of representatives of timber industry and trade included in the national delegations.

As usual, the Committee reviewed developments during 1955 in the European markets for sawn softwood, pitprops and pulpwood, and discussed prospects for 1956. The course of the softwood market in 1954, the Committee noted, showed many parallels with the previous year: continued firmness, and a balanced relation between supply and demand, confirmed the Committee's prognostications of a year earlier, but once again the total volume of trade exceeded expectations. Though purchases had been much higher than expected, strikes and chartering difficulties in some countries indicated that overlying stocks would be greater this year than last. While f.o.b. prices had remained steady since the end of 1954, rising freights had, in the course of 1955, stepped up the landed prices of goods bought f.o.b. The Committee noted that the advance in prices recorded since it last met meant that international prices had now gradually moved up to near the levels recorded at the peak of the 1951 boom. Re-selling prices, in the face of consumer resistance, again lagged behind replacement costs, and most importing countries again reported further inroads by competing materials at the expense of sawnwood.

Meeting earlier in the season than is customary, the Committee's appraisal of the prospects for the coming year was fraught with more uncertainty than usual. Though the general outlook for the principal wood-using industries remained good, it was too early to judge the possible effect of new credit restrictions in certain countries. Assuming that industrial activity continues at its present high level and that the rate of building in most European countries is maintained, the Committee believed that the stability which has characterized the European sawn softwood market for the last three years was likely to continue. There were, in fact, indications that the European sawn softwood trade might, in 1956, top the 4 million standard mark for the first time since the war.

The volume of production and trade in pitprops had remained almost unchanged in 1955 and was expected to continue so in 1956. Though coal production is rising, wood economies, the trend away from wood in the mines, and increased domestic supplies (through greater use of hardwoods and more efficient utilization of thinnings) suggested that total European import requirements of pitprops are not likely to show any substantial change.

As for pulpwood, the Committee remarked the steadily rising trend in Europe's requirements and noted with great interest the considerable progress reported in several countries in using increasing quantities of hardwood for pulping. Though requirements were expected to increase further in 1956, the Committee, after reviewing the various supply possibilities, did not consider that the situation for the coming year justified any alarm.

After reviewing the market situation, the Committee turned its attention to a number of technical ques-

tions. On contract practices, it heard a report on the progress made at the first session of the Working Party on the Standardization of General Conditions of Sale for Timber from the Working Party's chairman, M. Blétry (France). Experts from 13 countries had attended the first session and had reached initial agreement on a series of standard clauses. Consideration will be given to certain important questions outstanding at the Working Party's next session in February.

The Committee noted with satisfaction the establishment, in agreement with the European Forestry Commission of FAO, of the Joint FAO/ECE Committee on Forest Working Techniques and Training of Forest Workers; it recorded its appreciation of the work already accomplished by study groups and by experts, and delegates expressed the opinion that high priority should be given to this work.

The Committee heard details of the provisional agenda for the FAO/ECE Joint Working Party of experts on forestry and forest products statistics which is to meet in Geneva in January 1956. Expressing the hope that all participating countries would nominate experts to join in the work of the forthcoming meeting, the Committee asked the Working Party to include in the work of its first session an examination of pulpwood statistics.

A lively discussion took place on the study, to be entitled "Trends in the utilization of wood and its products", which is now being started by the FAO/ECE Secretariat in co-operation with other divisions of ECE. Delegates explained the official and private research which was being carried out on these problems in their own countries. In some cases these enquiries were prompted by the national need to effect wood economies; in others, the principal aim was to promote the use of wood. More rational utilization was an element common to both these approaches. Delegates pledged co-operation in the Secretariat study, which, they believed, when completed, would be of considerable value in helping countries to formulate well-considered forestry and timber policies.

An innovation at the 13th session of the Timber Committee was the arrangement, at the request of certain delegations, of a number of small meetings among countries directly interested to discuss special import/export problems. It was reported that satisfactory progress had been made in these meetings, and that the conversations would be pursued by the countries concerned through regular channels. The Committee expressed its satisfaction with the initiative taken by the Secretariat in arranging for such direct conversations in view of the practical contribution which such contacts could make in developing a freer flow of trade among the nations of Europe.

Land Problems in the Near East

The FAO Conference has paid a good deal of attention to the subject of the reform of agrarian structures. Regional meetings have at various times urged the Director-General to organize seminars on the social aspects of land problems, and in compliance a training center for the Near East was arranged, under the Expanded Technical Assistance Program, and held at Salahuddin, in Northern Iraq, from 2 to 20 October 1955.

The Center was attended by some 40 high-ranking participants from Afghanistan, Egypt, Iraq, Iran, Jordan, Lebanon, Libya, Pakistan, Saudi Arabia, Sudan, Syria and Turkey. The League of Arab States, the Near East Foundation, the United Kingdom and the United States of America sent observers, and the International Labour Office and the International Bank were represented. Attendance at general discussions was further increased by 28 trainees from six countries of the region who were at the same time taking part in a training course organized with the assistance of FAO, by the International Co-operation Administration of the United States of America (ICA).

The Forestry Division had been asked to participate in the running of the Center. It is generally conceded that tree cover is of particular significance in the Near East. Industrial and economic development are dependent upon raising the incomes of agricultural people, who constitute some 90 percent of the region's population. As incomes rise, and with them education and standards of living, wood is likely to become more greatly in demand, whether for paper and books, for better homes, for more small agricultural implements, for fuel in winter or for cooking. Industrial expansion will need to absorb additional amounts of wood as is explained in an article earlier in this issue.

Shortage of wood may, therefore, be a primary factor hampering economic development and, taking first things first, it is the medium- and low-grade timber requirements for use on farms and which cannot be imported but must be produced locally, that needs first consideration.

Limiting factors to the desired rise in agricultural incomes and consequently the economic development of the region, are insufficient intensity of farm production; lack of diversity of crops which exposes the small farmer to climatic and market risks attending a one-sided economy; low value crops and the lack of small amounts of capital for individual farm improvements; redundant rural populations and partial or seasonal employment only.

At the training center in Iraq it was emphasized that the direct benefits of tree-growing on farm areas could contribute greatly in improving each of these situations. Tree-crops have often proved more profitable than agricultural crops in many countries of the region and they are certainly a better form of land-usage on marginal lands, or on areas where irrigation must be restricted. They help balance a one-sided farm economy and act as a "savings-bank" and a source of capital when crop failure or the need for farm improvement calls for emergency funds. Finally, a general tree-planting policy can provide the raw materials for local industries and thus afford some avenue of employment to redundant rural populations and part-time work to the farmer and his draft animals during the slack agricultural season.

Other obstacles to agricultural improvement are poor yields owing to climatic limitations and uncertain water supplies. Here again, stress was laid on the role of tree cover and its indirect protective effect on improving low incidence and uncertain distribution of moisture, especially on near-desert areas and on dry alluvial plains where the desiccating effect of wind needs to be reduced. Forest or other vegetative cover on watersheds can help ensure regular water supplies upon which countries in the Near East depend for their agriculture.

Tree-planting outside the forest and on agricultural lands was explained as being not only directly and indirectly beneficial in increasing farmers' incomes, but was, indeed, the only solution to providing immediate supplies of medium-grade timber. Increased production from indigenous forests is, in view of their depleted state, only a long-term policy.

The last and most important obstacle to development in agriculture was shown to be the forms of tenure obtaining, and the remedial measures recommended would influence tree-planting. All measures aiming at land reform had to be complemented by credit and co-operative programs. Land settlement projects were playing a most important role in the region and should be regarded as demonstrations of the best kind of reform measures. Security of tenancy was a vital need but the problems set by the power of landlords, middlemen and money-lenders, by illiteracy, lack of technical knowledge

and suspicion of the government had all to be solved before improvements in this direction could be made. Expropriation was generally approved by the country representatives attending the center where absentee landlordism and oppressive tenancy conditions were concerned, and a solution to the *impasse* of improving tenancy conditions was thought to lie in the State acting as intermediary between landlord and tenant, by taking a long-term lease from the former at a frozen rent and sub-leasing to tenants at low rents, with reasonable security of occupancy supplemented by credit, education and technical aid.

This useful discussion center was commemorated, at the closing ceremony, by the planting of a tree which, as stated on the scroll prepared for the signature of all participants, symbolized by its roots and branches "the many-sided endeavors which must ceaselessly develop and work together in the establishment of a comprehensive land use policy as an essential and stable factor in national welfare."

International Chestnut Commission

The third session of the International Chestnut Commission for which FAO provides the secretariat, was held at Rome from 19 to 25 September 1955.

In the course of this session participants were afforded the opportunity of visiting the privately-owned chestnut coppice forests on the *Colli Albani* near Rome, whose management was explained and discussed. The owners find these forests so profitable financially, that chestnut coppice is preferred to vineyards and other agricultural crops even in the valleys. There was a study tour to Genoa and Cuneo during which members visited the chestnut forests at Busalla, a very famous name in the history of the spread of chestnut blight in Italy. It was here, in fact, that in the summer of 1938 this parasite was recorded for the first time in the country. As a result of the disease, the chestnut high forest that at the time covered the whole area was converted into coppice. Fortunately, though, the shoots sprouting from the old stumps have reacted so vigorously to the disease, healing up new infections, that the blight's menace to chestnut coppice may now, to all practical purposes, be disregarded.

The delegates then visited the chestnut groves in the Cuneo region and discussed cultivation techniques. Before the appearance of chestnut blight, over 50,000 hectares were covered with these groves, constituting one of the major sources of income for the entire region. The annual production of chestnuts was in fact of the order of 50,000 tons, and 60,000 to 70,000 tons of wood for tannin were utilized each year. Both the area and production have decreased in the past few years, mainly because of the blight's severe attacks. The problem is now being tackled by the conversion of the diseased groves into coppice and interplanting of other species where appropriate.

The session was opened by the Commission's Chairman, Mr. A. Oudin (France), Director of the National Forestry School at Nancy, assisted by Mr. A. Biraghi (Italy), Vice-Chairman, in the presence of Mr. M. Leloup, Director of the Forestry Division (FAO) and of Mr. A. Camaiti (Italy), Director-General of Forests and Mountain Economy. Representatives from nine countries were present: France, Greece, India, Italy, Japan, Spain, Switzerland, the United States and Yugoslavia; the International Union of Forest Research Organizations (IUFRO) and the European Confederation for Agriculture (CEA) were also represented.

The Commission recognized that chestnut growing, once the basis of the rural economy in certain areas, is now undergoing a severe crisis, especially in Mediterranean countries. This is mainly due to a marked drift of people away from the countryside, which in turn brings about both a decreased consumption of the nuts and inadequate tending of trees, and ultimately a reduction of the chestnut-bearing area and spread of disease. Member Governments were invited to draw up new management plans for the lands under chestnut, within a general program of land utilization, keeping in mind the following points:

(*a*) chestnut groves should be confined to those areas where conditions are such as to allow production of first-grade nuts;

(*b*) a portion of the former groves should be converted into coppice to provide local agriculture and industry with the wood products they most need;

(*c*) the remaining groves should be replaced by other forms of land use, such as agricultural crops, grazing, or plantations of rapid-growing timber trees.

The progress made in the drawing up of a chestnut distribution map covering the Mediterranean region was noted by the Commission, which issued directives to countries concerned, with a view to completing this work. Member Governments were asked to speed up the compilation of ecological forms, particularly those for sites near the perimeters of the chestnut vegetation area.

As for ink disease and chestnut blight, which are still spreading in certain countries, the Commission considered that experience now shows that the control of these two diseases may be feasible and practicable. Control efforts should not only be continued, but also intensified, so that a start can be made with the full-scale re-planting of resistant chestnut types, according to the local economic and social needs. FAO was asked to help IUFRO financially in carrying out further experiments on blight control, using planting material from the United States.

In the field of wood utilization, the Commission recognized that, even if other materials were now being preferred to chestnut wood for certain uses, new outlets were, nevertheless, continually being found, such as chestnut flooring which is of growing popularity in France and Greece. There are also good prospects of a wider use of chestnut in the field of wood chemistry, and this will be re-considered in more detail at the Commission's next session.

A report on the Latin-American Forestry Commission will appear in Unasylva, *Vol. 10, No. 2.*

Equipment News

Interest in the development of forest utilization and woodworking industries is reflected in the continual demand for information on new equipment. The Forestry Division, FAO, collects such information and passes it, on request, to Member Governments: a selection is published here. FAO accepts no responsibility for the claims of manufacturers.

LOGGING ARCH WITH ELECTRIC DRIVE ASSIST. — Combines features of prime mover with logging arch which can be interchanged with scraper or rear-dump hauling unit. Prime mover also used for road construction, etc.

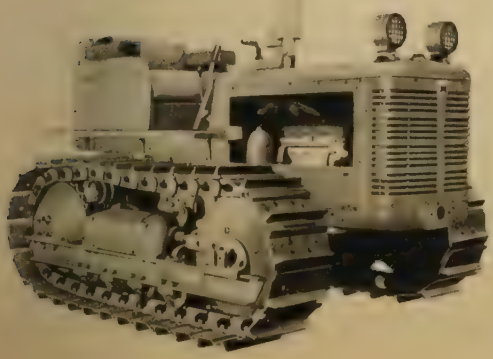
Latest improvement is A. C. electric drive assist for steep gradients.

Manufacturer: Le Tourneau-Westinghouse Co., Peoria, Ill., U.S.A.

MULTIPURPOSE CRAWLER TRACTOR. — Oliver Model OC-3 has variety of special attachments for angledozing, bulldozing, digging of post-holes or trenches (photo) backfilling, levelling, snow-plowing, skidding, loading, lifting, plowing (of fire lines), etc.

Specifications: 4 cylinder Diesel engine: 21.8 drawbar h. p. Three speeds: 2.0 to 5.3 m.p.h. (3.2 to 8.5 km/h), one reverse 2.3 m.p.h. (3.7 km/h). Drawbar pull up to 3,940 lb. (1,790 kg.). Standard width of tracks 10 in. (25.4 cm.), gauge (center to center of tracks) 42 in. (1.07 m.). Overall length 100 in. (2.54 m.), over-all width 52 $^{5}/_{16}$ in. (1.33 m.). Minimum clearance at drawbar 12 in. (30.5 cm.). Operating weight approx. 3,860 lb. (1,750 kg.).

Manufacturer: Oliver Corp., 400 West Madison Street. Chicago 4, Ill., U. S. A.



NEW VERSION OF CRAWLER TRACTOR. — New BTD-6 tractor, 25 percent more powerful and 21 percent heavier than the former model, completely redesigned in all vital parts.

Specifications: 4-cylinder Diesel engine model IH, 50.5 b. h. p., 47.5 belt h.p. (observed), 41.9 drawbar h. p. (estimated). 5 speeds: 1.5 to 5.4 m.p.h. (2.42 to 8.7 km/h), one rev. 1.7 m.p.h. (2.74 km/h). Also available with distillate engine (BT-6) of 42.5 b.h.p., 38.7 max. belt h.p., and 33.1 max. drawbar h.p. Over-all length 104 in. (2.64 m.), over-all width 64 in. (1.63 m.), turning radius 74 in. (1.88 m.), min. ground clearance 7 $^{3}/_{8}$ in. (19 cm.). Standard track width 14 in. (35.6 cm.). Weight incl. driver approx. 9,100 lb. (4,130 kg.). Ground pressure in op. 5.54 lb./ sq. in. (0.390 kg./sq. cm.).

Manufacturer: International Harvester Co. of Great Britain Ltd. 259, City Road, London E.C.1. England.

Go-getter 4-Wheel-drive Tractor. — Independently suspended, power steered front wheels oscillate vertically up to 16 in. (40.6 cm.). Hydraulic suspension system gives front end clearance of 36 in. (91.4 cm.); tractor can operate in up to 48 in. (122 cm.) of water. Two operator's seats arranged in opposite directions. Power transmitted to wheels through hydrokinetic torque converter with planetary gearset. Special attachments: live power take-off, 7½ ton winch, logging arch, loading boom, bulldozer blade, fire plow, brush guard or safety canopy, swinging drawbar, fifth wheel (for connecting to trailer unit), two speed differential, Diesel or LP-gas power-plant, hour meter, tachometer and Go-Hauler pulpwood trailer.

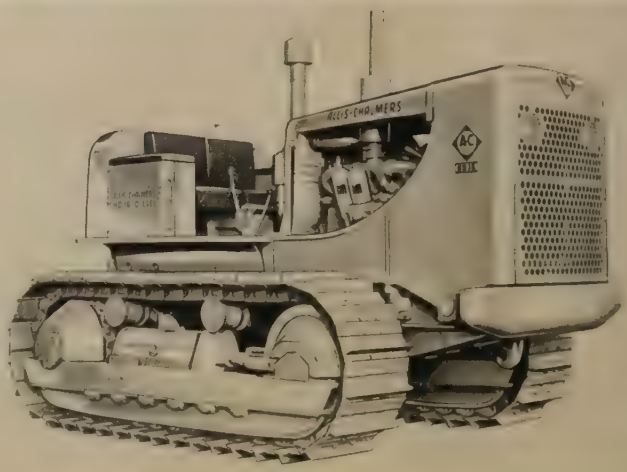
Manufacturer: The C.I. Capps C. Inc., Jacksonville, 6 Fla., U.S.A.

Diesel Crawler Tractor. Heavy-duty Allis-Chalmers HD-16 Diesel tractor available with standard transmission (HD-16A) or hydraulic torque converter drive (HD-16AC).

Specifications: 6 cylinder Diesel engine Allis-Chalmers HD-844. Rated r.p.m., governed at full load: 1600 (HD-16A) and 1800 (HD-16AC).

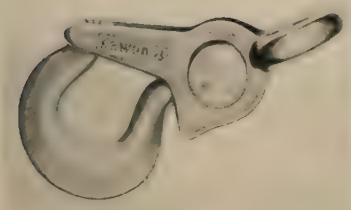
Weight: HD-16A, 31,500 lb. (14,300 kg.), HD-16AC 31,600 lb. (14,350 kg.). Ground pressure 8.2 lb. sq. in. (0.58 kg/cm²).

Manufacturer: Allis-Chalmers Tractor Division, Milwaukee, Wis., U.S.A.



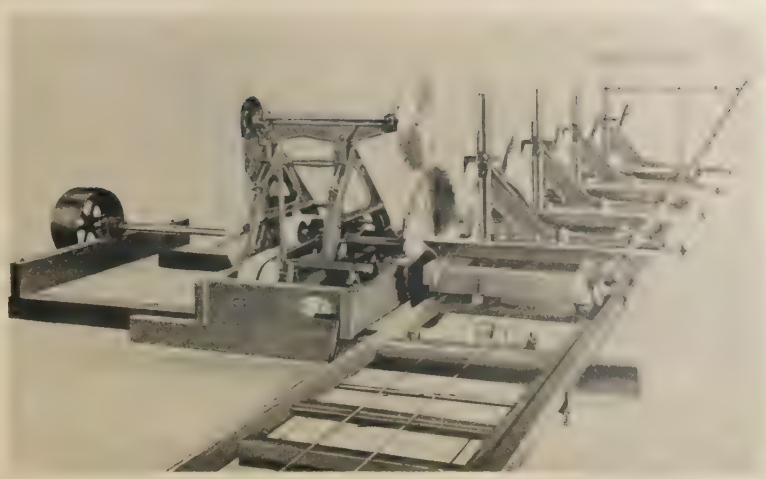
Hydraulic lorry loader. — Can be fitted to most types of lorries. It hoists, slews, and lowers, controlled by single lever on side of lorry. Power transferred by take-off from lorry engine. Hydraulically operated support leg relieves lorry chassis and springs from strain. When not in use, crane jib stowed behind cab. No side overhang and main pillar of crane is only 9 to 12 in. (23 to 30.5 cm.) higher than cab, depending on type of lorry. Telescopic jib, combined with fully positive power slewing through 180°, allows wide range of operation. Safety device prevents overloading or over-hoisting.

Manufacturers: Lorry Loaders Ltd., (subsidiary of R. H. Neal and Co., Ltd.) Plant House, Ealing, London W. 5. England.



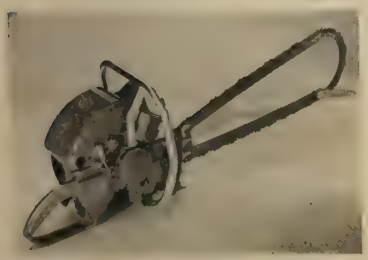
Self-locking Safety Hook. With this new hook design, lifting load automatically locks gate. To open, hook must be unloaded and manually pressed against a compression spring. Gate made of manganese bronze alloy of 110,000 lb. sq. in. (approx. 7,700 kg/sq. cm.) tensile strength.

Manufacturer: Newman Manufacturing and Sales Co., Box 5939, Kansas City 11, Missouri, U.S.A.



Portable Sawmill. — No. 3 Jumbo Sawmill equipped with a 20 ft. (6.10 m.) carriage, four taper-movement headblocks, optional top saw rig. With top rig max. combination of saws is 64 in. (163 cm.) bottom and 36 in. (91.4 cm.) top. Headblock opening 54 in. (137 cm.) Standard equipment includes endless feed, gigback belts and horizontal scale board. Carriage axles and wheels fitted with Timken roller bearings. Power required, 100 to 200 h.p. Daily capacity, 7,000 to 25,000 ft. b. m. (approx. 30 to 115 m³). Approx. weight 9,000 lb. (4,100 kg.).

Manufacturer: Frick Company Inc., Waynesboro, Pa., U.S.A.



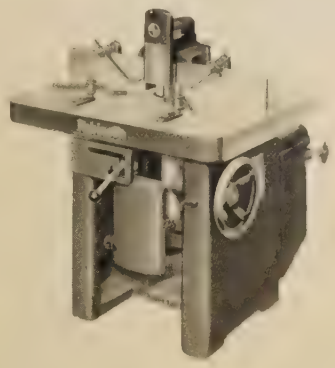
Chain saw Clearing Attachment. — Attachment with jaw-grip spike renders Homelite Model 17 chain saw very suited for felling, bucking and limbing of small trees and saplings. Allows plunge-bucking of logs right on ground, spike keeps chain off dirt and prevents logs from rolling. Can be very quickly fixed instead of ordinary chain blade. Easy operation with one hand.

Manufacturer: Homelite Corporation, Port Chester, N.Y., U.S.A.

Motor-driven Spindle Molder. — The spindle molder type EC/T possesses some new and interesting features. Unique single lever control enables operator, besides starting and stopping machine, to apply spindle brake locking device. This control is foolproof. Operator can, if necessary, bring spindle to rest by moving lever with his knee. Main driving motor is hinged in swinging position, automatically and continuously tensioning belt in direct proportion to load applied to cutter-spindle.

Optional accessories include a combined exhaust hood and guard.

Manufacturer: Thomas Robinson and Son, Ltd., Rochdale, England.



Tilting Arbor Saw. — This Model 36-B, 8 in. (20.5 cm.) saw runs on sealed precision ball bearing arbor unit. Blade, together with guard and splitter, tilts up to 45 degrees and can be securely locked in each position, while large table always stays flat. Dadoing and groove cutting done with blade, which can be replaced by a molding and shaper cutter for moldings, tongue and groove joints, etc.

Manufacturers: Toolkraft Corporation, Springfield, Mass., U.S.A.

Routo-jig. — Portable electric tool combining the functions of a jig-saw, router, jointer and shaper table. Useful for trades which involve cutting, jointing or shaping of wood, plyboard, composition or plastic. Rectangular base converts Model 140 Routo-Jig for saw work while a circular base makes it a router. Attached in inverted position to a shaper table, tool becomes shaper and jointer.

Manufacturer: Porter-Cable, 56 Exchange Street, Syracuse, N.Y., U.S.A.

News of the World

The items appearing here are condensed from newsworthy material collected by FAO staff or submitted by correspondents. FAO assumes no responsibility for statements and statistics in items accepted in good faith from contributors.

Alaska

• The third, and by far the largest, contract for sale of National Forest timber in Alaska involves about 500,000 acres (202,350 ha.) near Juneau. A large pulp mill is to be constructed and the timber will be removed over a term of 50 years under the principles of sustained yield management. The initial installation is to be completed by 1961 with an annual cut of at least 100 million board feet (453,000 m³) which is to be increased over the next 20 years to a minimum requirement of 160 million board feet (724,800 m³).

Argentina

• A report to the Latin-American Forestry Commission says that, in the forests in the south of Argentina, management systems are being studied for lenga (*Nothofagus pumilio*), coihué (*N. dombeyi*), ñire (*N. antarctica*), ciprés (*Libocedrus chilensis*) and pehuén (*Araucaria araucana*). Each of these species, in its climax area, forms pure stands or is mixed with an underwood of medium-sized shrubs.

Nothofagus pumilio is one of the main species in sub-antarctic forests and is found from the Neuquén Territory to Tierra del Fuego (38°-54° lat. S.), in the north occurring on mountain slopes up to 1,000 meters and in the south up to 400 meters. In the areas where the climate is favorable (Rio Negro, Chubut and Neuquén), the species occurs in uniform stands usually of over-mature trees, so that conditions are propitious for the spread of insects, fungi and fires. The present management plans aim at complete logging of these mature stands so that they may be gradually replaced by young trees of satisfactory growth.

In its climax areas *Libocedrus chilensis* also forms pure, even-aged stands or grows mixed with coihué and ñire. Silviculture concentrates on the extraction of the over-mature or defective trees in successive stages. New stands must be of a suitable density in order to prevent the lateral branching characteristic of this species, and so increase the output of industrial timber. Thinning systems are designed with this end in view.

In the case of both lenga and ciprés, the aim is to replace these with known species whose adaptability and growth have been proved.

Araucaria araucana, very important for its industrial uses, forms pure even-aged stands and grows at altitudes of 1,000 meters. It is also found in association with lenga. The age of the existing stands is 150-200 years and more, and the annual increment is very small. Experiments have indicated that to obtain a regular yield, selection cuttings should be made at long intervals in order to protect the young plants from unfavorable weather factors. To secure the reforestation of the cut-over areas, direct seeding is supplemented by planting.

Australia

• The Minister in charge of the Commonwealth Scientific and Industrial Research Organization (Melbourne) has announced to the Australian House of Representatives that experiments had shown that a thin film of cetyl alcohol spread over the surface of water reduced evaporation by 50 percent or more. In the laboratory evaporation has been reduced by 80 percent. The process was simple and cheap and tests which were expected to be completed within 12 months, were very promising. The process could be of outstanding importance in saving Australia's water, particularly in arid areas.

• Since 1946, experiments have been carried out on the resin-tapping of plantations of *Pinus caribaea* established by the Forestry Commission on the northern coast of New South Wales. The project has involved the study of three types of faces – American, New American and French – the effect of acid stimulation on gum flow, the effect of temperature on yield, the effect of two faces per tree on the yield per face, and the effect of tapping on the growth rate of trees.

The yields of the American and New American methods were approximately equal, that of the French method considerably less. Acid stimulation increased gum yield for the first season only. Yield, particularly from acid stimulated faces, fell off markedly after the first season. Two faces per tree increased the yield per tree over one face, but the average yield per face decreased. Faces on the side of the tree receiving maximum sunlight yielded no more gum than faces on the opposite side. The growth rate of tapped trees was reduced significantly.

The yields in the experiment were considerably less than those obtained in other countries, but the diameter of the tree was less than in the United States and the faces were smaller than those customarily used. Additional work on a new site and involving new subjects of study is planned.

Canada

• An article by a member of the Ottawa Laboratory in a recent issue of the *Forest Products Journal*, published by the Forest Products Research Society, Madison, Wisconsin, U.S.A., discusses means and methods for more economic use of wood in manufacturing containers and pallets.

Industrial expansion in Canada continues and many people often fail to realize the impact of this development on what may be termed the service industries. Among these, the containers industry plays an important role.

Whatever the material used for their manufacture, containers of an endless variety of sizes and weight-bearing capacity must be produced to package the stream of goods that must be transported from producer to consumer. Until fairly recent times, wood, with few exceptions, was used in the production of shipping containers. With the introduction of fibreboard and metals to the container field, wooden containers of all sorts are being replaced by containers manufactured from other materials. While the total volume of containers continues to grow, there has been a steady downward trend in the use of those made from wood. Data supplied by the Canadian Bureau of Statistics shows that although the net national income nearly doubled in the period 1946-51, the value of wooden containers and box shooks produced in 1951 was $34 million compared to $36 million in 1946.

The work of the Containers Unit of the Forest Products Laboratories of Canada aims at determining and assessing the many factors involved in the suitability and effectiveness of containers. In doing so, use and production trends are noted, and when it becomes apparent — as is the case with wooden containers — that an unfavorable situation is developing, an analysis of the causes is attempted.

• It is reported that the Government will finance the building of a $2 million pulp and paper research laboratory to be located near Montreal. The laboratory would be operated by the Pulp and Paper Research Institute of Canada under a 99-year lease. Plans are well advanced, and the project may be completed by the end of 1956.

The aim of the new laboratory would be to help Canada catch up with the Scandinavian countries in pulp and paper research. Although Canada is the world's leading producer and exporter of newsprint, the country is still behind Sweden, for instance, in research.

Caribbean

• The first interest in forestry shown by the Caribbean Commission which is made up of representatives of France, the Netherlands, the United Kingdom and the United States, was the convening in 1946 of a Conference of Caribbean Foresters and the publishing of a report entitled *Forest Research Within the Carribbean Area*. Following a recommendation by the Fourth Session of the West Indian Conference, the Commission decided to hold a conference on Caribbean timbers, their utilization and trade within the area.

The Conference was held in Port of Spain at the Commission's headquarters, in April 1953. Canada and the Inter-American Institute of Agricultural Sciences in Turrialba, Costa Rica, also sent observers.

The recommendations of the Conference may be summarized as follows:

1. *Forestry*: The strengthening of government forest departments to secure better utilization of forest resources, improved communications to and within forest areas, adoption of systematic management, improved storage, handling and market facilities.
2. *Shipping and freight rates*: The Caribbean Commission to approach various shipping authorities in the region with a view to securing reduction in freight rates, increased intra-Caribbean service, supply ships more suitable for lumber, elimination of the necessity for transshipment, better port, landing and storage facilities.
3. *Group marketing*: Forest departments, in consultation with the timber trade, to compile lists of lesser known timbers to permit group marketing. Governments of producing countries to take lead in utilization of these grouped timbers by purchasing them for public purposes.
4. *Manufacture*: Governments to encourage by every possible means, the better manufacture of forest products, emphasis to be given to better milling, preservation and drying practices.
5. *Standardization*: Governments and timber trade to introduce uniform milling sizes and grades.
6. *Statistics*: Steps to be taken by governments in the compilation of statistics of forestry and regional statistics submitted to the Conference by the central secretariat to be completed and published by the Commission for general use.
7. *Tariffs*: Governments to study possibility of reducing customs duties on timber products with a view to facilitating regional trade in these commodities.
8. *Timbers*: Compilation, for publication, with assistance of the United States Tropical Forest Region in Puerto Rico, of lists of timbers of present and potential regional importance.
9. *Promotion and education*: Governments to educate the public in the value of forests and in the availability and use of local timbers by such means as the radio, school curricula, local government publications and propaganda films.
10. *Co-ordination*: Caribbean Commission to appoint suitable officer to undertake co-ordination and dissemination of information on all matters pertaining to forestry and timber trade within the region.

The Commission accepted the report of the Conference and action has since been taken to implement the recommendations. FAO has provided an officer to study the possibilities for pulp and board manufacture in the area, and another officer is now advising on timber marketing.

Egypt

• The Egyptian National FAO Committee reports that in order to develop the country's resources of forests, the Ministry of Agriculture established, in 1953, a Permanent Committee for Forests and Timber Trees, including representatives from the Ministry of Agriculture, Ministry of Public Works and Faculties of Agriculture. The Committee formulated a national policy for the development of timber trees based on the following principles:

1. A growth study of different species, indigenous or exotic, should be made throughout the country.
2. A study of the physical and mechanical properties of wood of the different species grown in Egypt is to be made.
3. A program should be launched for the importation of more timber tree seeds from countries on the same ecological range.
4. Sustained annual supply of tree seedlings must be established to meet the demands of tree planting and afforestation throughout the country.
5. The plantation of timber trees should be confined to the following areas:
   (*a*) Land that is definitely unsuitable for agriculture or pasture purposes owing to the nature of the soil, remoteness or topography. The only possible use to which such land can be put is the growing of timber trees. Areas of such a nature are located on the coastal region of northern Egypt, Kom Osheim (Fayoum Province), Sinai mountains, and the sand dunes of northeastern Egypt, Amirya, etc.
   (*b*) Areas which surround the big cities such as Cairo and Alexandria. Such areas, when covered with timber trees, will decrease the intensity of prevailing winds and prevent the nuisance of dust. Besides, such trees will also provide shade and serve for other aesthetic purposes.
   (*c*) Areas along highways, roads, drains and canals. According to a present estimate, the length of unplanted roads, canals and drains amount to about 50,000 kilometers (31,000 mi.). Such length, if planted, would be equivalent to an area of 100,000 acres (40,450 ha.) of forest land.
   (*d*) Small areas on farms that are usually left over without use for some physical or economic reasons. Farm woodlots could be established on such lands.

In 1953, a project was formulated by the Ministry of Agriculture for promoting the cultivation of timber trees on a nation-wide basis. This project called for the production of 12 million trees within four years. The trees produced are distributed among the growers in the Nile Valley as well as the desert areas having water resources that allow for the cultivation of timber trees.

The project also aims at the planting of trees in the coastal strip of the Eastern desert, at Boseli near Rosetta, and at the oasis to control sand dunes.

In 1954, the nurseries of the Ministry of Agriculture (which amount to 25 distributed throughout the country) produced more than 2 million trees as against 1.5 million in 1953. These trees were distributed among the inhabitants, governmental and

semi-governmental agencies at a price of 5 millimes per tree.

The Kena forest, which is located in Upper Egypt, covers about 243 acres (98 ha.) of timber trees. The area of Kom Osheim forest was about 125 acres (50.5 ha.) and 200 additional acres (81 ha.) have been planted to make a total area of 325 acres (131.5 ha.). A few spare areas of about 20 acres (8 ha.) were planted in North Delta provinces. The species used were predominantly *Eucalyptus* and *Casuarina*. Other species were also used such as *Tamarix*, caya, mahogany, sesso, *Acacia*, poplar, maccarium, and a few others. It is worth mentioning that the aforementioned species are not susceptible to plant diseases that might spread to field crops and orchards. All species are successfully growing in all localities and the *Casuarina* and *Eucalyptus* trees made exceptionally good growth.

In 1953, the Ministry of Agriculture imported twenty species of *Eucalyptus* from Brazil, as well as some species of cedar and bauhinia from Iraq. In 1954, the Ministry imported seeds of coniferous trees such as *Pinus* and *Cupressus* from Turkey, *Acacia* and *Cupressus* from India, and *Marksilea* from the United States.

Ethiopia

• Included in the celebrations for the Coronation Jubilee of the Emperor of Ethiopia in November was an international exhibition at Addis Ababa. The Minister of Agriculture requested the members of the FAO Mission to Ethiopia to write pamphlets on their respective fields of work for printing and distribution to the visitors at the exhibition. The FAO forestry expert produced a pamphlet entitled *The Forest Resources of Ethiopia*, based on available reports and his own experience of the country. Ethiopia imports annually about Ethiopian $500,000 worth of wood, wooden furniture and plywood, plus about Ethiopian $300,000 worth of paper. This is a somewhat paradoxical situation considering that the country has a climate which is on the whole eminently suitable for forests and that population pressure in many areas is only light. The methodical exploitation of the existing forest resources and the creation of new forests could provide raw material for a considerable expansion of the existing sawmills and for new industries. Five Ethiopians sent under FAO Fellowships are now studying forestry in Australia. On their return, they will form the nucleus of the future Ethiopian forest service.

Guatemala

• Guatemala's forest law was adopted by the Congress of the Republic in 1945. It had certain important deficiencies, however, and in recent months various decrees have been issued with the aim of improving it.

In 1950, the President of the Republic, in application of Article 31 of the Forest Law, issued a decree dealing with the control of forest fires which are very severe in the country. The decree orders the formation of fire brigades by all the municipalities of the Republic, to which landowners must contribute in proportion to the size of their holdings, and which must be composed of a minimum of 15 men, and be ready for immediate mobilization on the request of the departmental forest officers or the Chief of the Forest Service.

Since the beginning of 1955, four interesting decrees have appeared. The first and most important is that of 25 May 1955, which sets up a National Forest fund. One of the principal obstacles to forestry development in most Central American countries is the insufficiency or uncertainty of funds for use by the forest services, which in any case are not strong. Guatemala's forest fund will derive income from the sale of forest products from State forests, from tax on the extraction of rubber and resins, from entrance fees to the National Parks, fines imposed for infringement of forest laws and from a tax on fellings. This decree revokes the part of the forestry law which enforced the replanting of a certain number of trees for each one felled.

Another decree, issued on the occasion of "Tree Week," created ten National Parks, one forest of about 2,000 hectares (5,000 acres) under a plan of management and two experimental forests. It is the responsibility of the Forest Service to determine the limits of these parks and forests, but it is an interesting development in the forest policy of Guatemala and an excellent way of giving "Tree Week" a special importance.

Another decree establishes reserved forest areas on public and private land, and sets out the restrictions imposed on these lands for a period of 15 years. A fourth decree gives honorary recognition to people or societies whose service to forest conservation has been outstanding.

India

• The Ministry of Commerce and Industry, Government of India, under its schemes for the training of artisans in modern wood-working machinery, has decided to establish four model carpentry wood workshops as well as mobile carpentry shops in the country, attached to the Small Scale Industries Institutes in Delhi, Bombay, Calcutta and Madras.

The scheme for the development of small-scale wood-working industries is meant for only small towns and larger villages where electricity is available, and where:

(*a*) facilities exist for continuous supplies of timber to feed a unit fully;

(*b*) there should be quick and complete off-take of the finished articles such as furniture, doors and windows, etc. from the factory;

(*c*) the setting up of the model shop does not lead to unemployment of carpenters already operating in that area;

(*d*) a maximum number of village carpenters can take advantage of the training-cum-production center.

• The Indian Council of Ecological Research at the Forest Research Institute, Dehra Dun, is attempting to build an ecological library and an appeal is made to all ecologists and ecological societies of the world for help. The Council trains teachers and post-graduate students from Indian universities in ecological research and offers facilities to research workers for carrying on original work and for consulting ecological works. Publishers of ecological books, ecological societies and ecologists are requested to help generously by sending as many of their publications as they can spare. Contributions will be gratefully acknowledged by the Secretary of the Council, Forest Research Institute, Dehra Dun (India).

Indonesia

• The Society of Foresters of Indonesia has produced an attractively illustrated booklet on *The Forests in Indonesia*, which gives information on the resource, planning, research, logging, silviculture, protection, wildlife management, education and engineering.

Balai Penjelidikan Kehutanan (the Forest Research Institute) has its office and laboratories at Bogor, a town about 40 miles south of Djakarta, the capital of Indonesia, on the lower slopes of the mountains Salak and Gedeh, at an altitude of approximately 250 meters (820 feet) above sea level. Bogor has an annual average temperature of 25°C, a rainfall of 4,278 millimeters (168 inches) and a relative humidity of 81 percent.

The Institute has four departments: botany, silviculture, technology and hydrology.

Each department consists of a number of sections, of which 20 are in operation.

The study of dendrology, especially the tree flora, one of the first and most important subjects, is the task of the botany department. The number of tree species in Indonesia reaches about 3,700. For identification of several tree species an extensive herbarium has been established, consisting of about 60,000 specimens. At present, the Institute is able to determine practically all trees to the species.

The study of resins, tannins, bamboo, rattan, etc. also belongs to the task of this department. Research on plant-sociology has also started.

Systematic research concerning the treatment of seeds, the method of cultivation, tending, the trend of growth and the producing ability of the important tree species has been carried out by the silviculture department. In addition, the study of dis-

eases and pests, selection, physiology, tapping experiments and all necessary operations are being done.

In aid of this research a great number of cultivation experiments and sample-plots have been laid out.

Iran

• At the invitation of the United States Foreign Operations Administration, Washington (now I.C.A.) and the United States Operations Mission, Iran, a staff member of FAO's Forestry Division assisted as an instructor in an International Training School on Range Management held in Iran from May to July this year.

The training course was originally planned at the vocational level but the instructors soon found that the plane of intelligence of the men participating was much higher than anticipated and that with one exception these men were all college graduates. There were 26 students – 20 from Iran and three each from Pakistan and Iraq. All of them are currently employed by their respective governments in some agricultural or veterinary capacity and without exception they were keen, alert, and highly interested in the subjects of range management. Some of the men, particularly those from Iran, were members of tribes who graze their livestock on the ranges and so are in a particularly good position to influence their people toward better management practices.

Mr. B. W. Allred, Chief of the Range Management Planning Section of the United States Soil Conservation Service, was leader of the training course and, in addition, there were 12 other specialists who served as instructors at various times. Classroom instruction was given in the form of lectures in English and these were translated into Persian by some of the Iranians. A paper was prepared covering each lecture; these are to be accumulated and bound into a range management handbook, which will be furnished to each student. The lectures were supplemented by field exercises and the students were particularly fortunate to have access to the Shah's game refuge which has been protected from livestock grazing for approximately 60 years. Two extensive field trips were taken by the students, one of ten days into the Caspian area and another lasting five days in the vicinity of Ramadan and Kormanagah.

Iraq

• The Iraqi delegation to the Conference of FAO reported that among the most important tasks achieved recently was the enactment of the Forest Law No. 75 of 1955. The forest policy of the Iraq Government is stated in the preamble of this law; instructions and regulations have been issued by the forestry department with the co-operation of the local administration concerning control of excessive cutting and transport of forest produce.

Demarcation and survey of four boundaries in the mountain and the riverside forests with the object of their protection and development are being continued. An aerial survey of the mountain forests was carried out recently. The interpretation of the photographs is being done at present by FAO experts working in the forestry department.

Plans and programs to introduce forestry to the public are being carried out. Pamphlets have been published and distributed. Articles of technical and popular nature have been written on forestry topics for radio broadcast and newspapers.

Furthermore, the following steps have been taken to give effect to a national forest policy:

1. The development of afforestation programs in most areas, previously of experimental nature, into large-scale projects, especially in northern Iraq. New experimental fields have been established in middle and southern Iraq.
2. A forestry research division is to be developed in the forestry department and is intended to be co-ordinated with agriculture research.
3. Several look-out stations and small buildings for forest guards have been built. Others are being planned as well as communication lines to connect these look-out stations.
4. Metereological stations are being set up in suitable areas in forest zones and plantation project sites.
5. A modest forestry budget was voted by parliament.
6. Handsome funds have been earmarked in the Development Board budget for the development of forestry.

Ireland

• An official report to FAO states that planting policy envisages a planned level of planting at a rate not less than 12,500 acres (5,000 ha.) per annum and its increase as soon as possible to a primary target of 15,000 (6,000 ha.) per annum. The actual rate of planting which was 12,500 acres (5,000 ha.) in each of the years 1952/53 and 1953/54 was increased last year, 1954/55, to a figure of 13,900 acres (5,625 ha.) and will be further increased in the current season, 1955/56, to the immediate target of 15,000 acres (6,000 ha.). This increase is made possible by the improvement in the reserve of plantable land and by the overtaking in recent years of arrears of general management operations.

Norway

• Proposals have been made by the Norwegian Institute for Atomic Energy for building an atomic reactor with a capacity of between 10,000 and 20,000 kW, near the pulp and paper mills of the large Saugbrugsforeningen Company, which could be used to produce some of the steam needed by the company for its production processes. Saugbrugsforeningen is the second biggest user of steam in Norway, its requirements being about 100 tons an hour. The atomic reactor could supply 10 to 20 tons.

The Institute for Atomic Energy already has a small reactor at Kjeller and visualizes the new plant mainly as an experiment to give practical experience in the construction and running of industrial reactors.

Paraguay

• A Technical Assistance officer, writing on the origin of the "petit grain" industry in Paraguay, says that the sour (bitter) orange is probably a native of Cochin China. Thence it spread to India and Persia and finally to the Mediterranean. The Jesuits introduced it into Paraguay from Spain, and planted the trees around their missions and settlements. They also introduced the sweet orange during the 17th and 18th centuries.

Both sweet and bitter orange escaped cultivation and, finding favorable soil and climatic conditions, spread wild and semi-wild over wide areas and into the forests. Hybrids were formed and there were possibly mutations. The wild trees, foliage and general characteristics of their fruit, together with the odor and bitter taste, have resemblance to the bitter orange, but the pulp is sweeter.

Three varieties of wild orange are locally distinguished: Apepú-jhai, the bitter orange, Apepú-jhee, the sweet orange, which gives a poor yield of oil, and the Apepú-i, the small orange, which should not be used for distillation.

Petit grain (bigarade) oil was apparently first distilled in the south of France and the Mediterranean in general. The leaves, exclusively from the bitter orange — *Citrus aurantium* — are still distilled to give a high quality of oil with an ester content of 60-68 percent. Haiti also produces about 10 tons annually of the oil, with a high ester content (60-80 percent), but the bulk of the world's production — two-thirds or more — now comes from Paraguay.

World production of citrus oils per year is roughly as follows:

Oil	*Tons*
Lemon	500
Sweet orange	600
Petit grain – Bigarade	10
– Paraguay	250
– Bergamot	100
Lime	120
Grapefruit	20

The *petit grain* oils are derived from the leaves only, the others by compression and extraction from the fruits.

Peru

• A thesis, prepared by a young Peruvian *ingeniero agronomo* and submitted to FAO, deals with the relative merits of creating plantations of *Casuarina cunninghamii* on dry coastal areas in Peru.

From an analysis of data, the author draws the following conclusions:

1. A comparison of the profit obtained from growing cotton on a sandy-stony soil with that obtained from growing *Casuarina cunninghamii* on the same type of soil shows that the annual average profit from a Casuarina plantation is the greater by $49.45 per hectare.
2. Production costs are lower with trees than with agricultural crops; fewer laborers are required; the problems of soil cultivation are easily solved; and the quantity of water required is less.
3. The establishment of a tree plantation is not a seasonal operation and may be undertaken as soon as an adequate water supply is available.
4. The basic sale price of the products is not influenced so much by fluctuations in supply and demand as in the case of other commercial crops.
5. In Peru, at the present time, there are no plant pests affecting either the growth of the trees or wood production whereas in dealing with other agricultural crops stringent pest control is required in order to avoid crop failure.
6. No specialized mechanical equipment is needed for the cultivation of *Casuarina*, which can be carried out with extremely simple equipment.
7. Labor shortage at the time set for felling does not decrease the ultimate revenue, whereas for agricultural cash-crops, a failure of the labor supply has an extremely adverse affect both on the quality and quantity of the yield.

Singapore

• The following Table, taken from an official report, well illustrates the wide area of trade enjoyed by this port. Principal receiving ports are shewn in brackets.

TABLE 1. - OVERSEAS EXPORTS OF TIMBER SAWN IN SINGAPORE, 1954

Exported	*Graded*	*Ungraded*	TOTAL
	..... *in tons of 50 cu. ft.*		
Aden	372	8 464	8 836
Arabia (Jeddah and Kuwait)	—	2 594	2 594
Australia (Sydney, Adelaide)	7 373	790	8 163
Bahrein	10	2 415	2 425
Brunei	—	174	174
Cyprus (Famagusta)	164	—	164
Denmark (Copenhagen)	10	—	10
Eire (Dublin)	2	—	2
Egypt (Port Said, Alexandria)	63	16	79
French Somaliland (Jibuti)	—	10	10
Hong Kong	—	500	500
India (Bombay)	—	20	20
Indonesia (various)	—	3 618	3 618
Iraq (Basrah)	2 244	3 886	6 130
Mauritius (Port Louis)	—	10 758	10 758
Netherlands (Amsterdam, Rotterdam)	129	—	129
New Guinea (Hollandia)	219	132	351
New Zealand (Wellington, Dunedin)	2 451	—	2 451
Norway (Oslo)	57	—	57
Pakistan (Karachi)	—	12	12
Portuguese East Africa (via Beria)	10	—	10
Reunion	—	275	275
Rhodesia (via Beria, Lourenco Marques)	171	—	171
Sarawak (Kuching)	—	12	12
South Africa (Durban, Cape Town)	1 564	—	1 564
South Korea	1 144	305	1 449
Sudan (Port Sudan)	4	—	4
Syria	—	80	80
United Kingdom (London, Liverpool, Avonmouth, Glasgow)	12 126	—	12 126
United States of America (Houston)	17	—	17
TOTAL	28 130	34 061	62 191

Sweden

• The Forest Research Institute of Sweden has gradually expanded in scope and organization from a modest beginning in 1902. The years 1912 and 1944 were particularly important in this development. In 1912, the Institute, which till then had been under the supervision of the Board of Crown Lands and Forests, became an independent body. At the same time, funds were allotted for the erection of a special building at Experimentalfältet, which was brought into use in 1915. In 1944, a reorganization was made resulting in an important expansion and a wider range of activities, and a new Institute building, as well as an extension and rebuilding of the old one. The new building was completed in 1945 and the old one was ready by the spring of 1947. The organization was further expanded between 1946-52. A new building for the study of genetics will be completed in 1956.

The Forest Research Institute is the national center for forest research. It has two main responsibilities. One, the scientific investigation of ways and means of tending the forests under different conditions: the other, the continuous record of the forest resources of the country together with estimates of the actual cut. Furthermore, it has the duty of assisting in the training given at the Royal School of Forestry.

These general prescriptions include numerous problems. To deal with these problems, the Institute is divided into six departments which are, in chronological order:

1. *Forestry*. In 1954 divided into two:
   Yield studies, under Prof. Charles Carbonnier,
   Forest regeneration, under Prof. Lars Tirén;
2. *Botany and soils*, under Prof. Carl Malmström;
3. *Zoology*, under Prof. Viktor Butovitsch;
4. *Forest survey*, under Prof. Erik Hagberg;
5. *Genetics*, under Prof. Ake Gustafsson;
6. *Work study*, under Prof. Ulf Sundberg.

Besides these six departments there is, for the Institute as a whole, a statistical office and a central office and also a laboratory for routine soil analyses.

The Director of the Institute is Professor Manfred Näslund.

• The forest villages of the *Stora Kopparbergs Bergslags Aktiebolag* in the Dalecarlia district of central Sweden were visited by the members attending the 1955 meeting of the *Norrlands Skogsvårdsförbunds* (Society of Northern Foresters) in August. The villages have been founded in the deepest parts of the forests to the north of Falun as a means of overcoming the difficulties of attracting forest workers in areas remote from the centers of population. The *Stora Kopparbergs Bergslags Aktiebolag* owns nearly 390,000 hectares of forest, of which 295,000 hectares are productive. To house temporary workers, mostly recruited from farming families during the slack season for agriculture, the company has built very small hutments deep in the forest for single workers, and camps large enough to house 30 to 40 in very comfortable conditions for those who prefer a less lonely life. In these camps the workers are lodged free, two or four to a room. They pay about 20 percent of their average daily wage towards food and other expenses.

The housing of the permanent workers, however, is a more difficult problem. The company has tried to solve this by the creation of forest villages sometimes rebuilding old villages which were abandoned in the nineteenth century and sometimes creating new settlements. One such village, almost entirely reconstructed, was visited. It consists of separate houses containing two bedrooms, a living room, an electrically-equipped kitchen with refrigerator, toilet, garage, central heating and in some cases two more bedrooms under the roof. Particularly noteworthy are the prefabricated houses, which can be assembled in a few weeks and cost between 35,000 and 45,000 Sw. kr. They are let to the workers by the Company at the rate of 700-800 kr. a year, equivalent to between two and three days' work a month. Workers are encouraged to build their own houses by low interest loans from the Company.

Several problems arise from the remoteness of these villages. There tends to be a shortage of young women who could found new homes and families. The education of children is another difficulty, since the education authorities prefer to have a central school rather than scattered small ones. The transport of workers from large central settlements to their place of work would be so expensive, however, that the conflict of interests here is hard to reconcile.

A visit was also paid to the *Siljansfors Försökspark*, the experimental forest of the Swedish Forest Research Institute, where a special study is being carried out on methods of natural regeneration of forests for pure pine or mixed pine and spruce in central Sweden. Very interesting cleaning methods are being applied on young regenerated areas of pine, carried out when the trees are about 1 meter high. The method is cheap and does not require much labor, and leaves the plantation thinned to the right density, in the right conditions for the next fellings in 20 or 25 years time, which will yield saleable stems suitable for pulp.

Syria

• The Forest Department comes under the Ministry of Agriculture, and its budget for current expenses is an integral part of the general budget of the Ministry. A special budget is however reserved for long-term projects. Amongst these are boundary delimitation, reforestation and the creation of nurseries and forestry research centers, and finally the constitution of a regional forestry school.

All the income from the exploitation and the protection of the forests is paid directly into the general treasury. This income may be irregular and small, and the Government applies its forest policy in the matter of protection, improvement and reforestation without trying to balance expenditure against receipts.

The expansion of the country's economy has enabled the State to develop its technical forest service so as to give greater care to the national forest resources.

Union of Soviet Socialist Republics

• A Soviet paper industry journal reports on various types of reeds and rushes tested for pulp suitable for the production of paperboard. The most suitable are *Phragmites communis*, which occurs over an area of about five million hectares in the Soviet Union in the vicinity of lakes; *Typha* (bullrushes), of which the most frequent types are *Typha latifolia* and *Typha angustifolia*; *Kamysh* (*Scirpus*), a reed grass of which 200 varieties are found in the Soviet Union, the most suitable being *Scirpus lacustris*.

The pulp yield of these reeds varies from 30 to 40 percent. One mill in Taganrog has produced 1,100 tons of paperboard annually from bullrushes. Board produced from rushes is cheaper than that produced from straw. Less material is required for each ton of board produced and once the harvesting of the rushes has been mechanized, the cost differences will be appreciable. A floating combine harvester for rushes is now being constructed.

• For some years now, Soviet foresters have been trying to solve the problems of establishing plantations in the tundra.

The settlement of the regions near the Arctic Circle and above all the opening-up of communications demand the solution of a problem which until recently has seemed insoluble, where the soil is perpetually frozen. The upper soil only thaws in summer to a depth of 40 to 60 centimeters. During the warmest months the average temperature of the air is about 9 or 10 degrees. The average temperature throughout the year is 5 or −6 degrees, and during the course of the winter it descends to −55 and −60. The summers are very short; very violent winds reach 35 to 40 meters per second. The soil is very poor, practically without humus, often very acid and swampy and covered with a thick layer of moss. In the zones where these rigorous conditions obtain, there are only isolated trees or scrub of no value, such as the black birch and some willows along the rivers or in the depressions.

The study of the problem of afforestation in the tundra was originally undertaken as a means of protecting the Pietchorski railway against snowdrifts. Each winter the measures against the blocking of the track by snow cost 10 million roubles of which half is spent on the 130 kilometers which cross the bare tundra. Besides, there is the enormous expense each year of the snow barriers. One kilometer of fencing costs 130,000 roubles, but these barriers do not last long under these conditions and their efficiency is low, while the mere cost of maintaining them is expensive. Now the application of the methods of plantation perfected in the most northerly part of the railway permits the establishment of a forest barrier 80 meters wide at a cost of only 35,000 roubles a kilometer, including the upkeep of the plantations for the first five years after establishment.

The first obstacle was the thick covering of moss and black birch which not only prevents the germination of seeds, but above all limits the summer thawing of the soil to a very shallow depth. It had been observed that, where the soil had been cleared during work on the railway, natural regeneration of trees or bushes took place. Near one of the most northerly stations on the railway, there is a small island of trees, completely isolated in the tundra, with bush and tree species such as birch, willow, fir, hawthorn, juniper, honeysuckle and currant bushes. The rate of growth of the young trees is very satisfactory and their terminal buds do not appear to be in the least affected by the frost. One finds 250 year-old fir-tree stumps of 40 centimeters diameter which were cut down in 1941 when the railway was constructed. The presence of this forested area is due to the quality of the soil in this place which is gravelly and consequently well drained and aired, unlike the rest of the tundra.

These discoveries lead to the conclusion that it is essentially the soil and not the climate which stops the forest extending further north, and that in consequence, an appropriate working of the soil would permit afforestation, on condition that the right tree species were used and were raised in conditions which would enable them to adapt themselves to withstand the rigorous climatic conditions of this region.

In fact, all the difficulties which result from the soil can be overcome. The harmful effect of the covering

moss and black birch has been [illegible] by clearing by machinery [illegible] aving bare the earth. Excess humidity has been dealt with by planting on hillocks created by mechanical means. Acidity has been surmounted by chalk dressing: the poverty of the soil by dressings of mineral and organic substances. The effects of wind, on the other hand, are reduced by planting and seeding in furrows between the bands of land where the moss covering and the black birch are left intact, or in the shelter of barriers of birch or willow already established.

In order to obtain plants resistant to local conditions, nurseries have been established since 1951, going gradually further north. The establishment of barriers for protection has followed the same progression. In the spring of 1954, the work had reached the point furthest north on the line near the station of Piesietz. An important barrier of 40 lines of trees has been established, admittedly on a relatively favorable clayey-siliceous soil which until work began on 16 June had only thawed to a depth of 30 centimeters. After tilling, the seeding and planting of fir, willow, larch, birch, hawthorn, and so on were carried out on 19 June and it was then discovered that, on 8 August, the thawing of the soil, which had scarcely increased on the land which had not been worked, had reached a depth of 2 meters on this land. In the autumn, it had reached 3 meters. The success of the young plants, with the exception of the larch, was 80 or 90 percent and germination took place in excellent condition in two weeks. In the autumn, the planting and seeding were followed by others of the same species as well as of pine, currant and other bushes, over an area of 12 hectares of plantation and 6 hectares of seeding. The barriers established vary in width from 56 to 110 meters.

United Kingdom

• The Jubilee of the Oxford University School of Forestry was celebrated on 1 October. The School was established in Oxford by Dr. William Schlich in 1905. Schlich was then still a member of the Indian Forest Service, but retired from this in 1911 and was appointed Reader in Forestry by the University, with the personal status of Professor. He launched a wide and successful appeal for the endowment of a Chair, and a Professorship of Forestry was established in 1920 and subsequently attached to St. John's College. A Pass Degree was established in 1918 replacing the original Diploma in Forestry.

Schlich retired at the end of 1919 and was succeeded by an old pupil, R. S. Troup. Professor Troup was largely responsible for the formation of the Imperial Forestry Institute and for its location in Oxford in 1924, and was for many years its Director as well as being the Professor at the School of Forestry. Troup was also concerned to improve the scientific background of the training, and his efforts led to the substitution of Honour Moderations in place of the Preliminary Examination in Science, with a consequent lengthening of the course to four years. In 1944, Forestry was made an Honours School.

Troup was also very active in attempting to secure better accommodation for the school and the Institute. A considerable sum was collected in the form of contributions, but it was not until after his death in 1939 and until the two institutions had been fused in a Department of Forestry that plans for a new building materialized under his successor, Professor Champion. The name of the Imperial Forestry Institute has been preserved as the name of the new building, which was opened by Princess Margaret in 1950, all parts of the Commonwealth having contributed timber for its equipment and embellishment.

• Forestry Commission Bulletin No. 25, *Studies of North-West American Forests in Relation to Silviculture in Great Britain*, Her Majesty's Stationery Office, London, (pp. 42, 6 shillings, 1955) results from a tour in British Columbian forests and those of neighboring areas in the United States, including Alaska and the State of Washington, to make comparative studies of Sitka spruce, Douglas fir and other species which have become important in British forestry. In this publication the author discusses the growth and environment of these species in relation to practices in the British Isles. On the basis of what he saw in North America, he suggests modifying, or confirms, current practices with regard to choice of site, mixtures, length of rotation, and silvicultural treatment of plantations of Sitka spruce, *Tsuga heterophylla*, Douglas fir, *Thuja plicata*, *Pinus contorta*, *Abies grandis*, *Abies amabilis*, *Tsuga mertensiana*, *Chamaecyparis nootkatensis*, *Alnus rubra*, and *Populus trichocarpa*. His observations on provenance of seed of these species offer guidance to their future introduction in the British Isles.

United States of America

• An official report to FAO states that legislation enacted since the last FAO Conference in 1953, of significance to the advance of forestry, included Public Law 566, which authorizes the Secretary of Agriculture to co-operate with local organizations, including State governments, soil conservation districts, conservancy districts, and flood-control districts, to prepare and carry out plans in small watersheds for works of improvement in the field of flood prevention and watershed protection. The emphasis is upon doing work in the upstream reaches of watersheds. One provision requires that, before any water retention structure can be built, the owners of at least 50 percent of the land in the watershed above the proposed structure must agree to use the land in accordance with an approved soil conservation plan — this for the purpose of reducing the possible flow of sediment and assuring that land treatment measures are included in project plans. The new act is expected to accelerate the improvement of forest land management in small watersheds.

In 1953, the banking laws were amended to permit national banks for the first time to make timber loans. Forest tracts offered as security are required to be under good management and fire protection in order to qualify.

In 1954, Congress authorized a soil and water conservation loan program for farmland improvement, including sustained yield afforestation and reforestation. Authority is given for both direct Federal loans and for Federal guarantee of loans by commercial lenders. The authorized repayment period may be up to 20 years.

Further progress was made during the two years in insuring standing timber from loss by fire. Commercial underwriters are now offering such insurance in a number of southern states, in New England, and on the Pacific Coast. In some cases, insurance on unmerchantable timber and plantations is available in addition to that on merchantable timber. It is anticipated that development of timber insurance will facilitate the expansion of forest credits.

• The Supreme Court has ruled that state legislatures have power to enact laws dealing with the beauty and sightliness of a community, thus greatly strengthening the hands of organizations and individuals working for tree-planting and roadside protection measures. The judgement of the Court states:

> "The concept of the public welfare is broad and inclusive. The values which it represents are spiritual as well as physical, aesthetic as well as monetary. It is within the power of the legislature to determine that the community should be beautiful as well as healthy, spacious as well as clean, well-balanced as well as carefully patrolled."

• In 1953, the Forest Service refused to grant permission to strip-mine for coal on National Forest lands in the State of Kentucky, and when the decision was appealed, a three-man committee, appointed to study and report to the Secretary of Agriculture, upheld the Forest Service's decision, thus establishing a sound safeguard in the use of such lands where the contemplated or desired use is contrary to the value for public forest purposes.

The hand of the Forest Service was further strengthened against misuse of the mining laws in July 1955, when the President approved a Congressional Bill which provides for multiple use of forest lands, thus preventing mining locators from

obtaining claim or title to valuable timber, former home sites or grazing land and water, an essentially fraudulent purpose for which the mining laws had been misused for many years. Mining claims hereafter will have to be for mining purposes only.

• The Department of Agriculture and the Army Chemical Corps have announced a new, cheap wood fibreboard that filters poison gases, disease-laden particles and the radioactive fallout of atomic explosions from the atmosphere. The material has been called "diffusion board" and was developed by the Forest Products Laboratory, Madison, Wisconsin, for the purpose of protecting troops and civilians from some of the most deadly effects of modern weapons. The board looks much like ordinary building fibreboard, but secret chemicals screen out deadly gases and particles, although oxygen passes through it as can carbon dioxide gas given off in breathing. It can be manufactured with much the same equipment used in making ordinary building fibreboard and many species of wood can be pulped to make it. Although developed primarily for military use, the board can be used in homes and other civilian buildings.

• Reports on the nuclear explosion tests carried out at Las Vegas early in the year indicate that the hardwood plywood used in furniture and mobile homes proved its worth. Furnishings with hardwood plywood components were located in ten homes situated at different intervals from the center of the blast — the first two at 4,700 feet (1,430 m.) from ground zero. The blast had a potency equal to 35,000 tons of TNT. Even in the primary target area, where two homes were completely destroyed, most plywood cases were found intact with only surface marrings. Furniture with a hardwood plywood surface did not retain radio-activity and was found to be almost immediately reusable by wiping or washing off the surface.

The ability of plywood to withstand the pressure and shock waves of an atomic explosion is credited to its crossply lamination which, it is claimed, gives dimensional stability and greater strength, per unit of weight, than steel.

Uruguay

• From all parts of the world, letters reach FAO bearing tangible evidence in the form of postage stamps of an increasing awareness of the importance of trees to national welfare. Uruguay has recently issued a postage-stamp portraying the ombú (*Phytolacca dioica*) which is indigenous to Argentina, Southern Brazil, Paraguay, Peru and Uruguay. Although its timber is of no commercial value, it is a beautiful shade and ornamental tree, growing rapidly in regions where prolonged heat and drought conditions make it impossible for other trees to grow.

In parts of Latin America, the ombú is the subject of innumerable stories, legends and songs, and it has become the object of traditional respect among rural populations. It has been said that the *criollo* affection for it lies in the fact that it serves as a traveler's guide in many inhospitable regions. It is often known by that name and indicates the presence of some habitation where one is certain of receiving traditional unbounded hospitality.

Venezuela

• After the conclusion of the Fifth Session of the FAO Latin-American Forestry Commission at Caracas in October last, the participants were taken by plane to visit the agricultural colonies of Turen and El Guarico. The Turen colony, situated in the State of Portuguesa, 400 kilometers west of Caracas, was started by the Government in 1939 for the purpose of opening up and cultivating an area of over 20,000 hectares of fertile land. Through the *Instituto Agrario Nacional*, an immense task has been carried out of clearing the forest, building paved roads, fences, irrigation canals, houses, grain storage, administration buildings, community buildings, army barracks, electric plants, hospital and airport. The area has been divided into lots of 25 to 40 hectares, and each lot is provided with a house and ancillary buildings. Over 500 families are already installed comprising Venezuelans and colonists of 15 different nationalities. They pay for the land and buildings over a 25-year period at 2 percent interest. Tractors and other farm implements are also purchased on credit and paid for in shorter terms. Production is directed towards four main crops: corn, black beans, sesame and rice. The planting of fruit trees is also encouraged and plants are provided from a central nursery. Forest trees have been planted along the roads, and windbreaks of natural forest have been left to protect the fields. A forest reserve of 30,000 hectares is being retained. The Turen project impresses a foreign visitor as an outstanding project of large-scale colonization combined with forestry.

The Guarico colony, situated 300 kilometers southwest of Caracas, will cover an area of 110,000 hectares, when completed. Here the land will be sub-divided into lots not smaller than 220 hectares. Probably not less than 60 percent of each lot will be devoted to livestock and the rest to crops. An area of forest has been preserved for the protection of the irrigation dam watershed.

Afterwards members of the Commission spent two days at Merida, where the new Latin-American Forest Research Institute and Training Center is to be located. They were welcomed by the Rector of the University of Los Andes, and the Dean and professors of the Forestry Faculty. The Faculty's buildings are quite modern and contain well-equipped laboratories, including timber testing machinery and a pilot dry kiln. A visit was made to the experimental forest in the Mucuy valley situated at an altitude of 200 to 300 meters, where the planting of different species to improve secondary forest growth, was demonstrated. In the nursery, an interesting experiment is being conducted on the adding of mycorrhiza to the nursery stock of *Pinus radiata*. There was quite a favorable difference in the growth when mycorrhiza were applied.

Participants were given the opportunity of seeing the "cloud forests" in La Carbonera which contain valuable *Podocarpus* species mixed with hardwoods, and the arid zones in Lagunillas where the Forestry Faculty intends to start test plantations with different species. *The Escuela de Capacitacion Forestal* (Forest Guards School) was also visited.

Yugoslavia

• Yugoslavia, like many other countries, endured a period of economic stress after the last world war. The forests were heavily drawn on for repairing damage to houses and communications and for exports of raw or processed wood to bring in badly-needed foreign currency. Yugoslav authorities and foresters, well aware of the dangers of exhausting the forest resource, have since been in constant search of ways and means of rehabilitating the forests and forest industries, towards which a number of FAO Technical Assistance officers have contributed.

An interesting development in the Technical Assistance Program was a meeting held in Dubrovnik last September. Organized, on the invitation of the Yugoslav Government, by the Forestry Division of FAO, the occasion enabled some 40 foresters and technicians from all the constituent republics to meet with the FAO Technical Assistance officers who had worked in the country, and to review the present situation of forestry and the woodworking industries in Yugoslavia. There were frank discussions on the progress made since the visiting experts had completed their assignments, and on the usefulness of the advice and help that had been furnished. The conclusions of the meeting were put in the form of recommendations to the Yugoslav Government as to the follow-up work that was considered desirable.

Also of note is the recent publication of a three-volume textbook on mechanical and chemical timber conversion by the Chief of the Wood Industry Division of the Forestry and Wood Industries Institute at Sarajevo. Written as a guide to forestry students, the textbook is likely to be also very useful to the wood-working industries themselves.

Selected Reviews

THE PLANNING OF MANAGED FORESTS (BY THE EXPERIMENTAL METHOD AND ESPECIALLY THE CHECK METHOD) H. E. Biolley, Translated from the French by Mark L. Anderson. pp. 72. The Scrivener Press, Oxford. 1954. 7s. 6d.

A third of a century has passed since Henri Biolley, District Forester in the Swiss Val-de-Travers, wrote the French original of this account of his life work, and laid the foundation of the application of experimental volume check methods in forestry. Since its publication in 1920 it has lost nothing of its pertinence or its practical worth. Credit must therefore be given to the translator for making it available now to English readers.

Past experience, particularly in Central European countries, has clearly shown that the establishment of pure, uniform stands with species often unsuited to the site greatly increases the risk of soil degradation and biotic diseases and, accordingly, sooner or later results in considerable increment losses. More or less uneven-aged, mixed forests of preponderantly native species, on the other hand, treated along natural lines, have proved to be healthier and more resistant to all kinds of external dangers; and in the long run such stands are more productive and easier to protect.

However, irregular stands of this type are definitely more difficult to manage: new methods and techniques had to be sought particularly for the establishment of inventories, increment control and yield regulation.

In Germany, mainly due to the influence of G. L. Hartig (1764-1837), yield regulation has, since the beginning of the 19th century, been effected almost exclusively by allotment or formula methods based on the conception of the uniform normal forest and of a regular succession of cutting areas. In France, on the other hand, endeavors were made to apply another kind of forest management which aims to bring all parts of the forest to a state of highest productive capacity in perpetuity. In 1878, a French forester, A. Gurnaud (1825-1898), published a description of a *méthode de contrôle* for the determination of increment and yield. In this method such determinations are subordinated to the silvicultural treatment of the forests. It was based on the fact that through careful, selective harvesting, the production of the residual stand will be improved, because every removal of timber is at the same time a cultural operation. By this method the increment of stands is accurately determined periodically with the object of gradually converting the forest, through selective management and continuous experimentation, to a condition of equilibrium at maximum productive capacity.

It was Henri Biolley (1858-1939), who, for the first time, applied Gurnaud's inspired ideas in practical forestry. From 1890 on, he managed the forests of his Swiss district according to these principles, devoting himself for almost 50 years to the study of increment and a treatment of stands directed towards the highest production, and proving the practicability of the check method. In 1920, he published this study giving a theoretical basis of management of forests under the check method, describing the procedures to be applied in practice (which he partly developed and simplified), and evaluating the results.

Biolley's pioneering work formed the basis upon which most Swiss forest management practices were later developed and his ideas have been generally accepted. Today, with the trend of intensifying forest management and productivity in most countries, the ideas and application of careful, continuous treatment of stands with the aid of the volume check method are meeting with ever growing interest, so that the publication of this English version is very timely.

PULPWOOD ANNUAL, 1955. Edited by American Pulpwood Association. pp. 130. Published by Pulp and Paper, New York. U.S. $1.00.

The papers presented at the annual meeting of the American Pulpwood Association contain a great variety of interesting information much of it applicable throughout the world to pulpwood and other forestry operations. For example, the excellent discussion of the use of chain saws, with rules for safety and fire prevention, can be of benefit to any chainsaw operator, wherever he may be. The experiences of the various authors in the use of machinery in pulpwood exploitation are the subject of several articles. One author has found that, for seasonal use, rental, rather than purchase, of heavy equipment is economical and may be expected to increase in popularity. Another describes a scheme for rating the degree of mechanization of a woods operation so that meaningful comparisons between operations may be made. Weight scaling of pulpwood loads delivered to the mill is shown to be more accurate, less biased, and faster than volumetric scaling. A machine for hydraulic barking of sawmill slabs is briefly discussed as an important step towards utilization of waste wood for pulp. Tree planting machines are reported to be receiving more use, some planting as many as 400,000 trees a year. Improved handling of chips for rail and truck shipment to pulp mills is described. Among these improvements are techniques for packing chips more tightly in the cars and devices for quick unloading.

The silvicultural side of pulpwood production is not neglected. An article on how to eliminate hardwoods considers briefly the problem of preventing replacement of pine stands by unwanted hardwoods. A list of priorities of timber types for hardwood girdling or poisoning is given. In another article the continued increase in the relative proportion of hardwood species to all species in the American Southeast is pointed out. To meet this situation, a pulpwood buying program is suggested that encourages cutting of hardwoods, so that woodland owners will find profitable the removal of unwanted species and retention of the more desirable softwoods.

A look into the future of the industry makes fascinating reading. Citing the findings of the Stanford Research Institute report, (*America's Demand for Wood*, 1929-1975, a report sponsored by the Weyerhaeuser Timber Co., published in 1954) one of the articles about the next fifty years and meeting its demand emphasizes the substantial growth to be expected in U.S. demand for pulpwood. On the assumptions that over the next two decades the population of the United States will rise by 32 percent and the total value of goods and services produced by 60 percent (in terms of constant prices), increased demand for all categories of pulp products will give rise to the need for an increase in domestic pulp production by 1975 of nearly 90 percent over the present level. This will connote United States mill requirements of nearly 49 million cords of pulpwood, as against 26.5 million in 1952. Increasing use of hardwoods and of mill residues will help to satisfy this rising demand. The broadening of the pulp industry's raw material base should ensure that pulpwood prices rise no faster than prices of competing materials or than the general level of prices. The article ends on an optimistic note about continued technological improvement in the pulp and paper industry resulting in better utilization of raw materials, improved quality of products, and low costs.

TAXATION OF THE FOREST INDUSTRIES IN ONTARIO. George C. Wilkes, pp. 102, University of Toronto Press, Toronto, 1954.

Tax laws and how they are administered are especially important to forest owners and industries where capital investments are often large as well as long-term. Property taxes and death taxes, for example, may be burdensome because they come due at times other than that at which the forest yields its income.

The author of this bulletin has made a thorough study of the tax

laws affecting the owners of forest land and forest industries in the Canadian province of Ontario, and, in addition, has reviewed the forest tax laws of several European countries and of the United States in order to provide comparisons useful in his Ontario analysis.

As may be expected, the present tax laws are found to be somewhat less than satisfactory for encouraging permanent forest management. Corporation income tax is criticized by many timber operators for its severe restricting effect on corporate savings which are necessary for continued development of forest resources and maintenance of working capital. Forest property is often assessed at a value which includes existing timber values, thus increasing the tax as timber matures, and encouraging premature cutting. Taxes for forest protection sometimes tend to be excessive from the standpoint of logging operators who cite the fact that fires are mostly caused by travelers, smokers, and campers who are not loggers.

Foresters will find the discussion of stumpage appraisals very interesting. The argument is advanced that a government should be careful to avoid high stumpage charges because, as a production cost to the industry, stumpage will appear in the price of the manufactured forest products. Cheap stumpage will enable the industry to continue competing with wood substitutes. The author points out, however, that stumpage appraisals will add flexibility to the stumpage pricing system, especially if the period between reappraisals is short.

An intriguing alternative to stumpage charges is suggested. A government can raise from taxes the revenue now received from stumpage and thus separate the income and expenditure phases of forest management. The author points out that, to discourage a company from holding timberlands in excess of its needs, a fairly high ground rent can be charged by the government.

Forests are useful for other purposes besides timber production, including, for example, watershed protection, wildlife management and recreation, and it is noted that only now are these non-timber values beginning to receive adequate recognition. It is evident that a balance of monetary receipts and expenditures need not be insisted upon in forest management for multiple uses and that forests may be assets to a community without producing high stumpage or tax returns.

This little booklet is worthwhile reading for anyone concerned with public forest policy in countries where financial problems are important. The period of transition from liquidation cutting to sustained yield forestry involves present sacrifices for future benefits. The author points out that shareholder dividends may be smaller, consumer prices higher, and both stumpage and tax returns may be lower during the period in which private industry and the government expend more funds in permanent forest improvements and communities.

FORESTRY AND RELATED RESEARCH IN NORTH AMERICA. F. H. Kaufert and W. H. Cummings. pp. 280, Soc. Amer. For., Washington, D.C. 1955. $5.00.

The threefold objectives which this comprehensive re-appraisal seeks to achieve are the determination of:

1. extent and adequacy of progress in research in relation to importance of forest resources;
2. status of current research – governmental, institutional, industrial;
3. future goals during coming 25 years, and how to achieve those goals.

The material presented is based on contributions from a large number of foresters. For the United States, a critical review is given as a basis for recommendations and goals of research. Stress is laid on the need for expansion and greater financial support for research, as well as on the responsibility for, and correlation of research by various agencies, personnel and their salaries, basic and group research, and dissemination of results. There is a brief summary of work in timber production or science, management and protection, in utilization, and in wildlife, range, watershed management and recreation fields. This portion of the book was prepared by a committee of the Society of American Foresters under the chairmanship of E. L. Demmon, President of the Society. Similar summaries are included for work in Canada and Mexico. The Canadian portion was prepared by a committee of the Canadian Institute of Foresters under the chairmanship of Dean J.W.B. Sisam of the Faculty of Forestry of the University of Toronto and summarized by S. T. Dana, Dean Emeritus of the School of Natural Resources of the University of Michigan. The report on Mexico was prepared by Dr. Enrique Beltran, Director, *Instituto Mexicano de Recursos Naturales Renovables*, and translated and edited by Dr. Tom Gill, Executive Director, Charles Lathrop Pack Foundation, Washington, D. C. The entire compilation was under the direction of Dr. Frank H. Kaufert, Director of the School of Forestry, University of Minnesota, and Professor W. H. Cummings of the School of Natural Resources, University of Michigan. The work was financed by a grant from the Rockefeller Foundation.

The value of this book lies not only in the impetus which it may be expected to provide for increased interest and support for research in the three countries covered; but also in the critical analysis it provides of the status of research. It should go far in fostering greater co-ordination of research effort among existing agencies, and in awakening responsible authorities in government, in schools, and in private forest industries to the worthwhileness of providing adequately for research work, from the standpoint of economic returns.

Similar objective summaries and critical analyses of past and current forest experimental work might, with profit, be undertaken by professional forestry societies or similar groups in other regions and in individual countries.

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No. 6 - Raw Materials for More Paper: Pulping Processes and Procedures Recommended for Testing 2.00 10s.

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Annual Subscription (post paid) 2.00 15s.0d.

Prepared jointly by the UN Economic Commission for Europe and FAO, it contains statistical data on various forest products for European countries and also Canada and the United States: also reviews the European softwood situation and timber market.

World Forest Resources 2.50 12s.6d.

Results of the inventory undertaken in 1953 by the Forestry Division of FAO.
March 1955, vi + 120 pp., graphs and tables (Trilingual)

The initial letters between parentheses indicate English, French and Spanish editions.

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1955, clothbound, 174 pp. (English) *$1.50 or 7s. 6d.*

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Intended primarily for the layman, the book outlines the Organization's objectives and the means by which it plans to meet them; its close co-operation with other activities and movements in the same or related fields and the services it renders to its 72 Member Nations under the Regular and Technical Assistance Programs. It will be of value to every reader interested in world affairs and their impact on individual countries.

The Work of FAO 1954-55 (Report of the Director-General)

1955, 123 pp. (English, French and Spanish) *$1.00 or 5s.*

THIS differs somewhat from previous annual reports since in 1955 FAO reached its tenth anniversary, which provided an occasion for a more general and comprehensive stock-taking than usual.

It relates to each Regular Program line of activity the pertinent projects under the Expanded Technical Assistance Program, thus reflecting the growing integration of the two services supplied by the Organization.

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